FOREWORD

This book is an Academic Manual of Universitas Negeri Padang which contains, among other things, a brief history of the early establishment of UNP, an overview of supporting units, and the curriculum of all study programs at UNP, both educational and non-educational programs as well as professions that refer to the Law of the Republic of Indonesia Number 12 of 2012 concerning Higher Education, especially regarding the Curriculum, Presidential Regulation of the Republic of Indonesia Number 8 of 2012 concerning the Indonesian National Qualifications Framework (KKNI), Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 73 of 2013 concerning Application of the National Qualifications Framework for Higher Education, as well as Regulation of the Minister of Research, Technology, and Higher Education of the Republic of Indonesia Number 44 of 2015 concerning National Standards for Higher Education.

We express our gratitude and high appreciation to the leaders of faculties, departments, study programs and their staff, drafting team, BAK and UPT PTIK who have worked hard to prepare this 2018 manual.

Hopefully this book can be used as a guide and used properly.

Padang, 24 July 2018
Chancellor,
Prof. Ganefri, Ph.D.
NIP. 196312171989031003
TABLE OF CONTENTS

FOREWORD ................................................................................................................................................i
FLAG OF UNIVERSITAS NEGERI PADANG ................................................................................... viii
HYMNE UNIVERSITAS NEGERI PADANG ....................................................................................... ix
MARS UNIVERSITAS NEERI PADANG ................................................................................................ x
HEAD OF INSTITUTION AND HEAD OF BUREAU ........................................................................ xii
HEAD OF TECHNICAL IMPLEMENTATION UNIT ............................................................................ xiii
LEADERS OF THE FACULTY OF MATHEMATICS AND NATURAL SCIENCES ...................... xiv
CHAPTER I GENERAL INFORMATION ............................................................................................... 1
   A. Brief History of Universitas Negeri Padang ................................................................. 1
   B. Fundamentals, Vision, Mission, Goals, and Motto ..................................................... 7

CHAPTER II ORGANIZATION ............................................................................................................ 8
   A. Senate ............................................................................................................................................. 8
   B. Chancellor .................................................................................................................................... 9
   C. Internal Oversight Unit ..................................................................................................... 9
   D. Advisory Council .................................................................................................................. 9
   E. Supervisory Board ............................................................................................................... 10
   F. Lecturer ...................................................................................................................................... 10
   G. Education Personnel ......................................................................................................... 10
   H. Academic Implementer .................................................................................................... 10
   I. Administrative Executor ................................................................................................ 19
   J. Supporting Elements ......................................................................................................... 19
   K. Students and Student Organizations ........................................................................... 26
   L. List of Leaders, Expert Staff and University Senate ................................................... 27

CHAPTER III CURRICULUM ................................................................................................................ 32
   A. University Courses .......................................................................................................... 32
   B. Credit Load by Educational Level ................................................................................ 34
   C. Course Codes and Meaning of Course Codes ............................................................ 34

CHAPTER VI FACULTY OF MATHEMATICS AND IPA ................................................................. 38
   A. Vision, Mission and Objectives of the Faculty .......................................................... 38
   B. Faculty Academic Information .................................................................................... 39
   C. TPB Course ....................................................................................................................... 40
   D. Academic Information at Department Level .............................................................. 41
      1. Mathematics Department ......................................................................................... 41
      2. Department of Biology ............................................................................................ 109
      3. Physics Department ................................................................................................. 165
      4. Department of Chemistry ....................................................................................... 223
      5. Science Education Study Program ....................................................................... 271
   E. ORGANIZATION AND PERSONNEL ............................................................................ 295
DECREE OF THE CHANCELLOR OF THE STATE UNIVERSITY OF PADANG  
Number : 817/UN35/EP/2018  

About  
Universitas Negeri Padang Academic Guidelines 2018  

CHANCELLOR OF UNIVERSITAS NEGERI PADANG  

Considering  
a. that in order to improve education services for students and the academic community of Universitas Negeri Padang (UNP) it is necessary to issue Academic Guidelines;  
b. that the Academic Guidelines contain general information, organization and curriculum within the Universitas Negeri Padang;  
c. that with respect to points "a and b" above, it is necessary to issue a Chancellor's Decree concerning the application of Academic Guidelines as a guide in educational services at Universitas Negeri Padang.  

Remembering  
1. Law Number 20 of 2003 concerning the System National Education  
2. Law Number 14 of 2005 concerning Teachers and Lecturers  
3. Law Number 12 of 2012 concerning Higher Education  
5. Decree of the President of the Republic of Indonesia Number 93 of 1999 concerning the Change of IKIP Padang to Universitas Negeri Padang  
6. Presidential Regulation Number 8 of 2012 concerning Indonesia's National Qualifications Framework  
7. Regulation of the Minister of Education and Culture Number 73 of 2013 concerning the Implementation of the National Qualifications Framework for Higher Education  
8. Regulation of the Minister of Research, Technology and Higher Education Number 10 of 2015 concerning OTK UNP  
9. Regulation of the Minister of Research, Technology and Higher Education No. 44 of 2015 concerning National Higher Education Standards  
10. Regulation of the Minister of Research, Technology and Higher Education No. 67 of 2016 concerning the Statute of Universitas Negeri Padang  
11. Regulation of the Minister of Research, Technology and Higher Education No. 90 of 2017 concerning New Student Admissions for Undergraduate Programs at State Universities  

Pay attention to : UNP Chancellor's Decree Number 137/UN35/AK/2018 dated 12 April 2018 regarding the 2018/2019 UNP Academic Calendar.  

DECIDING  

First  
Universitas Negeri Padang Academic Guidelines for the 2018/2019 Academic Year are used as Academic Guidelines by students and the entire academic community of Universitas Negeri Padang.  

Second  
This Universitas Negeri Padang Academic Guidelines can be used by students for the 2018/2019 academic year until they finish attending education at Universitas Negeri Padang.  

Third  
This decision shall come into force as from the date of stipulation, provided that if in the future it turns out that there is an error in this stipulation, it will be amended and corrected accordingly.  

Stipulated in : Padang On :  
July 24 2018 Chancellor,  

Prof. Ganefri, Ph.D.  
NIP. 196312171989031003  

Copy:  
1. Minister of Research, Technology and Higher Education of the Republic of Indonesia in Jakarta  
2. DiChancellor General Belmawa Kemristekdikti in Jakarta  
3. Inspector General of the Ministry of Research, Technology and Higher Education in Jakarta  
4. All UNP Vice Chancellors  
5. All Faculty Deans at UNP  
6. All Heads of Institutions/Heads of Bureaus of UNP  
7. All Heads of UNP Study Programs
SYMBOL

SYMBOL MEANING
UNIVERSITAS NEGERI PADANG

With the issuance of the Decree of the President of the Republic of Indonesia No. 93 of 1999 dated August 4, 1999, IKIP Padang changed its status to Universitas Negeri Padang. With the change in status, Universitas Negeri Padang (UNP) has the following tasks:

1. Organizing academic education programs and/or professional education in a number of disciplines of science, technology and/or certain arts.

2. Develop education, teacher training, and educate academic and professional staff in education.

UNP has a symbol in the form of a white circle with a black border in which there is the inscription UNIVERSITAS NEGERI PADANG at the top and UNP writing at the bottom flanked by black dots on the right and left, a blue circle with a yellow border inside there is a pair of yellow wings and the inside is white, three yellow and white books arranged in tiers, and above it is a white container where a red fire burns.

I. Shape Philosophy

The UNP symbol consists of two elements, namely absolute and relative forms:

a) The absolute form is a circle, which means that UNP always stands firmly on scientific truth and strives and develops based on that truth.

b) The relative shape is wings, three books, and a burning fire, meaning that UNP always accepts the truth from anywhere and develops to carry out the mission according to the task it carries out.

II. Meaning of the Image on the Emblem

a. Circle has the meaning that UNP produces human resources who believe and fear God Almighty, capable of quality Academic Education, Professional Education, and Vocational Education based on Pancasila and the 1945 Constitution;

b. Wings have the meaning of dynamic, creative, and innovative;

c. Three books arranged in tiers have the meaning of the tridharma of higher education; and

d. The burning fire has the meaning of intelligence, enlightenment, the foundation of life, and the development of society, nation and state.

III. The Meaning of the Colors on the Coat of Arms

a. Black has the meaning of firmness in carrying out tasks;

b. Blue has the meaning of depth and coolness;

c. Yellow has the meaning of greatness and majesty of mind;

d. Red has the meaning of dynamic, creative, innovative, and always open to renewal; and

e. White has the meaning of purity and sincerity.

IV. Colors and Color Code

<table>
<thead>
<tr>
<th>No</th>
<th>Symbol</th>
<th>Color</th>
<th>Color Code/RGB (Red-Green-Blue)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Circle</td>
<td>Black Chrome Yellow Cobalt Blue</td>
<td>R: 0 G: 0 B: 0 R: 255 G: 167 B: 0 R: 0 G: 71 B: 171</td>
</tr>
</tbody>
</table>
UNP has a rectangular flag, with a length to width of 3:2 (three to two) in yellow color with the color code R:255, G:255, B:0 in the middle there is the UNP symbol.
HEAD OF INSTITUTION AND HEAD OF BUREAU

Prof. Dr. Rusdinal, M.Pd
Chairman
Research and Service
To the Community Institute
(LP2M)

Dr. Edwin Musdi, M.Pd
Chairman
Learning Development
and Quality Assurance Institute
(LP3M)

Drs. Yushamdi
Head of
Academic Bureau
and
Student Affairs
(BAK)

Afdalisma, SH., M.Pd.
Head of
Bureau of General Affairs
and Finance (BUK)

Drs. Ahmad Hamdani, MM
Head of
Bureau of Administrative Planning
And Public Relation
(BPAKHM)

HEAD OF TECHNICAL IMPLEMENTATION UNIT
(UPT)

Dra. Asmar Yulastri, M.Pd, Ph.D
Head of UPT. Career Development and Entrepreneurship

Dra. An Fauzia Rozani Syafei, MA
Head of UPT. Language

Dr. Ardoni, M. Si
Head of UPT. Library

Drs. Aswardi, MT
Head of UPT. PTIK

Dra. Yarmis, M.Pd., Kons
Head of UPT. Services and BK
LEADERS OF FACULTY OF MATHEMATICS AND NATURAL SCIENCES (FMIPA)

Prof. Dr. H. Lufri, M. S
DEAN

Dr. Yullifli, S.Pd, M.Si
VICE DEAN I

Drs. Hendra Syarifundin, M.Si, Ph.D
VICE DEAN II

Dr. Hardeli, M.Si
VICE DEAN III

HEAD OF PROGRAM (FMIPA)

Muhammad Subhan, S. Si, M. Si
Mathematics

Dr. H. Azwir Anhar, M.Si
Biology

Dr. Ratnawulan, M.Si
Physics

Dr. Mawardi, M. Si
Chemistry

Dra. Yurnetti, M. Pd
Science Education

xiv

xv
CHAPTER I
GENERAL INFORMATION

A. Brief History of Universitas Negeri Padang

Universitas Negeri Padang (UNP) is the result of the conversion of IKIP Padang into a university, which was originally called the Teacher Education College (PTPG). Since it was founded on September 1st 1954, UNP has undergone many changes. In the history of its development, the changes that have occurred include not only its name and position, but also the status and educational programs it has developed, in accordance with policies to meet the demands of educational development in the country. This change can be classified into six periods, namely the PTPG Batusangkar period, the FKIP period at Andalas University Bukittinggi in Batusangkar, the FKIP period at Andalas University Padang, the IKIP Jakarta Branch Padang period, the IKIP Padang period and the UNP period.

1. PTPG Batusangkar Period (1954-1956)

The period PTPG Batusangkar began to be established with six departments, namely the Department of Indonesian Language, the Department of History, the Department of English, the Department of Economics, the Department of Exact Science, and the Department of Biology. However, many first-generation students moved to PTPG Bandung and to PTPG Malang because lectures had not been running properly. As a result, very few students survive. Because of that, the department that originally numbered six was reduced to four departments that still have students, namely the Department of Indonesian Language, the Department of History, and the Department of Economics, and the Department of Mathematics. However, in 1955 a new department was opened, namely the Law Department, which was later listed as the first major to produce a bachelor's degree in education in 1964.

2. The period of FKIP Andalas University (Unand) Bukittinggi in Batusangkar (1956-1958)

In 1956 PTPG throughout Indonesia was integrated into local universities. Although the integration was a change of status, for PTPG Batusangkar which was integrated into Andalas University, Bukittinggi, the policy hardly affected previous programs. The regional upheaval that occurred at that time caused a slight bottleneck in the implementation of the lecture program for one year, from 1957 to early 1958.
3. FKIP Unand Padang Period (1958-1964)

After experiencing congestion until early 1958, FKIP Unand was reactivated on June 10, 1958 and on September 1 in the same year its position was transferred from Batusangkar to Padang. It was only after 1958 that FKIP Unand developed more steadily. In 1961, all B1 courses throughout West Sumatra were integrated into FKIP, namely B1 English courses and B1 History courses in Bukittinggi and B1 courses in Indonesian, Exact Science, Commerce, and Physical Education in Padang. Subsequent developments occurred with the opening of several new departments, namely the Department of Education Advisors, the Department of Life Sciences, the Department of Social Education, and the Department of Fine Arts. Almost all new majors develop the Baccalaureate program.

4. Period of IKIP Jakarta Padang Branch (1964-1965)

In 1964, FKIP Unand Padang was separated from Andalas University and became IKIP Jakarta Padang Branch. By organizing the existing departments, four faculties emerged, namely the Faculty of Education (FIP), the Teaching Faculty for Exact Sciences (FKIE), the Teaching Faculty for Social Sciences (FKPS), and the Teaching Faculty for Arts (FKSS). During this period, the Physical Education Department of FKIP, which was originally a B1 Physical Education Padang, changed its status to the Padang Branch of the Jakarta Sports College (STO), under the Department of Sports.

This period was a transitional period before IKIP Padang was independent. At the end of 1964 a new faculty was formed, namely the Faculty of Engineering Teacher Training (FKT), from a private institution which was fostered by the Development and Welfare Foundation of IKIP Padang. Thus, the Padang Branch of IKIP Jakarta has five faculties so that it is eligible for status as an independent IKIP.

5. The period of IKIP Padang as an independent institution (1965-1999)

As of August 7, 1965, with the Decree of the Minister of Higher Education and Science (PTIP) No. 351/1965, IKIP Padang has the status of an independent IKIP. The institute consists of five faculties with 14 departments, namely (a) FIP with the Department of Educational Sciences and the Department of Social Education, (b) FKPS with the Department of History/Anthropology, the Department of Economics/Cooperatives, and the Department of Civics/Law, (c) FKIE with Department of Exact Sciences, Department of Life Sciences, Department of Natural Sciences, and Department of Chemistry (d) FKSS with Department of Indonesian Language and Literature, Department of English Language and Literature, and Department of Fine Arts, and (e) FKT with Department of Machinery, Department of Civil, and Department of Architecture.

In May 1966, all IKIP Padang activities were moved to Air Tawar. Since then the institute has gradually begun to build its campus, and develop wider programs so that in 1969 there were 21 departments in five faculties.

Since the first year of Five-Year Development I, IKIP Padang has grown rapidly. In 1970, IKIP Padang had a Laboratory School consisting of SMA and STM Laboratory. Two years later, January 1, 1972 the Laboratory School was completed with Kindergarten, Elementary School, and Junior High School. In the same year, IKIP Padang was assigned the responsibility to implement the Pioneer School Development Project.

Starting from the 1975 academic year, reforms in the field of program development were initiated with the use of the semester credit system (skls) which in 1979 was implemented in all universities throughout Indonesia in accordance with the decree of the Minister of Education and Culture.

The following years, 1976 and 1977, non-degree programs were opened in response to the increasing demand for secondary school teachers. This program without a degree or certificate program is known as the First Advanced School Teacher Education (PGSLP), with majors in Natural Sciences (IPA), Mathematics, Indonesian, and English. In 1977 this certificate program was expanded by opening new fields of study, namely Guidance and Counseling, Service Skills, and Craft Skills. Meanwhile, in the same year, another certificate program was opened called Senior High School Teacher Education (PGSLA) with the study areas of Biology, Physics, Chemistry, Mathematics, Indonesian and English. Both types of certificate programs last until the year 1978.

With the integration of the Sports College (STO) in 1977, IKIP Padang added a new faculty, namely the Teacher Training Faculty of Sports Science (FKIK) with the departments of Sports Coaching, Problematics and Recreation, and Sports and Health. Thus, IKIP Padang has six faculties.
In 1979 IKIP Padang opened the S0, S1 and Teaching Deeds I, II, III and IV programs. The S0 program consists of the D1, DII and DIII programs which specifically produce junior and senior high school teachers.

With the Decree of the Minister of Education and Culture dated March 14, 1983, the names of faculties in IKIP were determined nationally, namely the Faculty of Education (FIP), Faculty of Language and Arts Education (FPBS), Faculty of Mathematics and Natural Sciences Education (FPMIPA), Faculty of Science Education Social Affairs (FPIPS), the Faculty of Health and Sports Education (FPOK), and the Faculty of Technology and Vocational Education (FPTK).

In 1990, according to the policy of the Minister of Education and Culture of the Republic of Indonesia that the implementation of the LPTK program under one roof, the Teacher Education Schools (SPG) and Sports Teacher Schools (SGO) in West Sumatra (Bukittinggi and Padang) were integrated into IKIP Padang to become the Department of Elementary School Teacher Education (PGSD) Class Teacher and Department of PGSD Physical Education (Penjas). This is done in order to improve the quality of elementary school teachers. Likewise, in 1994, School of Special Education Teachers (SGPLB) Bandar Create Padang was also integrated into IKIP Padang to become the Department of Special Education (PLB) at FIP IKIP Padang.

The Postgraduate Program (PPs) of UNP has been initiated since 1981 under the name Credit Collection Activities (KPK) under the guidance of the Postgraduate Faculty of IKIP Jakarta with the Education Administration study program. The status of the KPK was upgraded to an independent study program with the Decree of the Di Chancellor General of Higher Education No. 517/Dikti/KEP/1992 dated December 31, 1992. In the academic year 1994/1995 the Education Administration Study Program was grouped into several concentrations, namely Education Management, Guidance and Counseling, Social Science Education, and Language Education. In 1996/1997, two concentrations were opened again, namely Educational Technology and Environmental Management. In 1997/1998 several concentrations had the status of Study Programs.


The change of IKIP Padang to Universitas Negeri Padang (UNP) was stipulated by Presidential Decree No. 93 of 1999 on 24 August 1999. Previously, based on the Decree of the Di Chancellor General of Higher Education of the Ministry of Education and Culture Number 1884/D/I/1997 dated August 1, 1997, by opening study programs: 1) Indonesian Language and Literature, 2) English Language and Literature, 3) Mathematics, 4) Biology, 5) Physics, and 6) Chemistry for the program level S1. While the study programs 1) Electrical Engineering, 2) Civil Engineering Buildings, 3) Mechanical Engineering, 4) Electronic Engineering, 5) Automotive Engineering, 6) Catering, and 7) Clothing are opened for the D3 Program Level. Thus, UNP not only prepares students to become educational staff but also prepares academic and professional staff in certain non-educational fields.

In the 1999/2000 academic year, UNP received approval again to open a new non-educational study program, namely S1 Management and S1 Sports Science. Then, in 2001, UNP reopened four non-educational study programs, namely: Mining Engineering (D3), Information Science, Libraries and Archives (D3), Accounting (S1) and Development Economics (S1) and the fields of education namely: Sociology and Anthropology Education. (S1). So, until the 2001/2002 academic year, UNP has opened 19 non-educational study programs and will follow for other study programs.

With the change of IKIP Padang to UNP, there was a change in the names of the faculties to become the Faculty of Education (FIP), Faculty of Social Sciences (FSS), Faculty of Languages and Arts (FBS), Faculty of Mathematics and Natural Sciences (FMIPA), Faculty of Engineering (FT), Faculty of Sports Science (FIK), and through the approval of DIKTI No. 2816/D/T/2004 dated July 22, 2004 and the Decree of the Chancellor of UNP No. 05/J.41/KP/2005 dated January 2, 2005, one faculty was added, namely the Faculty of Economics (FE), then in 2015 through the approval of the Minister of Research, Technology and Higher Education and the Chancellor's Decree No. 175/UN35/KP/2015 On 15 July 2015, one more faculty was added, namely the Faculty of Tourism and Hospitality.

For the Postgraduate Program (S2) in 2001, a permit was issued to open the Guidance and Counseling Study Program. Thus, in 2001 PPs UNP had 6 study programs, namely Education Administration, Social Studies Education, Language Education, Educational Technology, and Basic Education. In addition, PPs UNP also has 10 concentrations, namely (1) Education Management, (2) Environmental Education Management, (3) Sports Education Management, (4) Indonesian Language Education, (5) English Education, (6) Education Economics/Geography, (7) History Education/PPKN, (8) Education Economics/Geography.
Sociology/Anthropology, (9) Educational Technology and (10) Vocational Education.


In addition to the Postgraduate Program above, in 2000 UNP opened the Master of Management (MM) Masters Program which was initially held in collaboration with UNP and the University of Jember. However, since the issuance of the Decree of the DiChancellor General of Higher Education No. 2596/D/T/2001 dated August 6, 2001, UNP has the authority to organize the Master of Management Program independently. In 2003, the MM Program was accredited to BAN PT based on the Decree of BAN PT No. 068/BANPT/Ak-II/S2/VII/2003. UNP’s MM program currently has three concentrations, namely Public Management, Marketing Management, and Human Resource Management.

Then on February 17, 2015, UNP again underwent a change from an ordinary Work Unit Government Agency, to a Government Agency with the status of fully implementing PK BLU. This change is based on the Decree of the Minister of Finance of the Republic of Indonesia No 335/KMK.05/2015 On February 17, 2015, the status of Universitas Negeri Padang was legalized as a Public Service Agency (BLU) so that it could apply flexibility in financial management and develop its assets and services in accordance with Government Regulation Number 23 of 2005 concerning Financial Management of Public Service Agencies as amended by Government Regulation Number 74 of 2012 and at the same time as the first agency to become a Public Service Agency in 2015.

For the 2018/2019 Academic Year, Universitas Negeri Padang has 8 faculties, 1 Postgraduate Program, and 101 study programs.

B. Fundamentals, Vision, Mission, Goals and Motto

1. Basic

As one of the higher education institutions in Indonesia, Universitas Negeri Padang bases its education program on Pancasila and the 1945 Constitution and the Outlines of State Policy. In particular, now UNP bases its activities on Government Regulation no. 4 of 2014, Presidential Decree No. 93 of 1999, and its implementing regulations, and the Statute of the State University of Padang in 2016.

2. Vision

To become one of the leading universities in the fields of education, science, technology, sports, and the arts based on moral values, religion and piety to God Almighty.

3. Mission

a. organize quality education in the fields of education, science, technology, art, and sports based on moral values, religion, and piety to God Almighty.

b. conducting research activities and disseminating knowledge, research results, and innovative learning models at the national and international levels.

c. Organizing community service activities so that the application of education, science, technology, arts and sports for the progress of the nation.

d. improve UNP governance.

e. enhance local, national and international cooperation.

4. Purpose

a. produce superior, moral, and religious graduates who are highly competitive and able to adapt to developments.

b. the implementation of student activities that form prospective leaders and entrepreneurs with character.

c. produce research to develop education, science, technology, sports, and arts and disseminate them.

d. the implementation of community service activities in order to help solve various community problems.

e. the creation of a credible university governance.

f. the establishment of synergistic cooperation with various institutions, both the central government and the private sector at home and abroad.

5. Motto

The motto of Universitas Negeri Padang is "Alam Takambang Jadi Guru (Open Nature Becomes the Teacher)".

2018 FMIPA Academic Manual
CHAPTER II
ORGANIZATION

The UNP organization is based on the Regulation of the Minister of Research, Technology and Higher Education of the Republic of Indonesia No. 10 of 2015 and the 2016 UNP statutes, which consist of the Senate, Chancellor, Internal Audit Unit, Advisory Council, and Management Organ Leaders.

A. Senate

The Senate is an organ that carries out the functions of determining, considering, and supervising the implementation of academic policies. The Senate has the following duties and powers:

a. Determination of academic policies, norms, and codes of ethics;

b. Supervision of:
   1. application of academic norms and code of ethics for the Academic Civitas;
   2. the application of academic provisions;
   3. implementation of higher education quality assurance refers to at least the national higher education standard;
   4. implementation of academic freedom, freedom of academic pulpit, and scientific autonomy;
   5. implementation of academic rules;
   6. implementation of the Lecturer's performance appraisal policy; and
   7. implementation of the learning process, research, and community service.

c. Implementation of the learning process, research, and service to community, giving consideration and process improvement proposal learning, research, and service of higher to the community to education leaders;

d. Giving consideration to higher education leaders in the opening and closing of study programs;

e. Giving consideration to the granting or revocation of academic degrees and awards;

f. Giving consideration to higher education leaders in proposing professors; and

g. Providing recommendations for imposing sanctions on violations of academic norms, ethics, and regulations by the Academic Civitas to higher education leaders.

B. Chancellor

The Chancellor is a UNP organ that carries out the function of determining non-academic policies and managing higher education for and on behalf of the Minister.

The Chancellor of the University consists of the Chancellor and Vice Chancellor, Bureau, Faculty and Postgraduate, Institutions and Technical Service Units. The Chancellor as the main person in charge, has the task of leading the implementation of education, research, and community service, as well as fostering educators, education staff, students, and their relationship with the environment. The Vice Chancellor consists of four people and a maximum of two people can be added to handle certain tasks according to development demands. Currently, UNP has four Vice Chancellors. Vice Chancellor for Academic Affairs, Vice Chancellor for Planning, General Affairs and Finance, Vice Chancellor for Student Affairs and Alumni, and Vice Chancellor for Cooperation and Information Systems.

C. Internal Supervisory Unit

It is a UNP organ that carries out non-academic supervisory functions for and on behalf of the Chancellor. The Internal Control Unit has the following duties and authorities:

a. Determination of internal control policies in the non-academic field of UNP;

b. Internal control over the management of non-academic education;

c. Preparation of reports on the results of internal control; and

d. Giving advice and/or consideration regarding repair management of non-academic activities at the Chancellor based on the results of internal supervision.

D. Advisory Council

It is a UNP organ that has the function of providing non-academic considerations. The Advisory Council has the following duties and authorities:

a. Conduct a review of the Chancellor's policies in the non-academic field;

b. Formulate suggestions and opinions on the Chancellor's policies in the non-academic field;

c. Provide non-academic considerations to the leadership of UNP in managing UNP; and

d. Assist the development of UNP.
E. Supervisory Board

The supervisory board has the task of supervising the development of PTN PK-BLU carried out by the Managing Officer of PTN PK-BLU regarding the implementation of the Business Strategic Plan and Business Plan and Budget as well as compliance with laws and regulations.

F. Lecturer

Lecturers consist of permanent and non-permanent lecturers. Lecturers are permanent lecturers who work full time with the status of permanent educators at UNP. Non-permanent lecturers are lecturers who work part-time with the status of non-permanent educators at UNP. Non-permanent lecturers as appointed by the Chancellor at the suggestion of the Dean of the faculty concerned in accordance with the needs and provisions of the legislation.

G. Education Personnel

The education staff at UNP consist of academic support staff and academic administrative staff. Academic support staff consists of librarians, computer administrators, public relations institutions, laboratory assistants, and technicians. Requirements, procedures for appointment, and authority for academic support staff are regulated by the university by referring to the applicable laws and regulations. Academic support staff are tasked with assisting the learning process, practicum, and providing library services and maintenance of media equipment used in the learning process. Academic administrative staff is the implementing element of academic administration which has the main task of administering all academic activities.

H. Academic Executive

Academic implementers in the fields of education and teaching, research, and community service are the Faculties, Research and Community Service Institutes, and Learning Development and Quality Assurance Institutes.

1. Faculties, Departments, Study Programs, and Postgraduate Programs

Universitas Negeri Padang currently has eight faculties, one Postgraduate Program, 102 S3, S2, S1, D3, D2 study programs and 1 counselor professional education program.

The names of the faculties, departments, and study programs are:

A. Levels Three, Two, One, Diploma, and Professional Programs

<table>
<thead>
<tr>
<th>FACULTY &amp; DEPARTMENT</th>
<th>STUDY PROGRAM</th>
<th>EDUCATIONAL</th>
<th>NON-EDUCATIONAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Faculty of Educational Sciences (FIP)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Educational Administration</td>
<td>Educational Administration (S1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special Needs Education</td>
<td>Special Needs Education (S1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Educational Technology</td>
<td>Educational Technology (S1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Out of School Education</td>
<td>Out of School Education (S1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guidance and Counseling</td>
<td>Guidance and Counseling (S1)</td>
<td>Guidance and Counseling (S2)</td>
<td>Guidance and Counseling (S3)</td>
</tr>
<tr>
<td>Elementary School Teacher Education</td>
<td>Elementary School Teacher Education (S1)</td>
<td>Elementary Education (S2)</td>
<td></td>
</tr>
<tr>
<td>Preschool Teacher Education</td>
<td>Preschool Teacher Education (S1)</td>
<td>Early Age Children Education (S2)</td>
<td></td>
</tr>
<tr>
<td>Psychology</td>
<td>Psychology (S1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Faculty of Language and Art (FBS)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indonesian Language and Literature</td>
<td>Indonesian Language and Literature Education (S1)</td>
<td>Indonesian Literature (S1)</td>
<td>Information, Library, and Archive Science (D3)</td>
</tr>
<tr>
<td>English Language and Literature</td>
<td>English Language Education (S1)</td>
<td>Japanese Language Education (S1)</td>
<td>English Language Education (S2)</td>
</tr>
<tr>
<td>Art</td>
<td>Art Education (S1)</td>
<td>Visual Communication Design (S1)</td>
<td></td>
</tr>
<tr>
<td>Drama, Dance, and Music Arts</td>
<td>Drama, Dance, and Music Arts Education (S1)</td>
<td>Music Education (S1)</td>
<td>Dance Education (S1)</td>
</tr>
<tr>
<td>FACULTY &amp; DEPARTMENT</td>
<td>STUDY PROGRAM</td>
<td>EDUCATIONAL</td>
<td>NON-EDUCATIONAL</td>
</tr>
<tr>
<td>----------------------</td>
<td>---------------</td>
<td>-------------</td>
<td>----------------</td>
</tr>
<tr>
<td>3. Faculty of Mathematics and Natural Sciences (FMIPA)</td>
<td>Mathematics</td>
<td>- Mathematics Education (S1)</td>
<td>- Mathematics (S1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Mathematics Education (S2)</td>
<td>- Statistics (S1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Statistics (D3)</td>
</tr>
<tr>
<td></td>
<td>Biology</td>
<td>- Biology Education (S1)</td>
<td>- Biology (S1)</td>
</tr>
<tr>
<td></td>
<td>Physics</td>
<td>- Physics Education (S1)</td>
<td>- Physics (S1)</td>
</tr>
<tr>
<td></td>
<td>Chemistry</td>
<td>- Chemistry Education (S1)</td>
<td>- Chemistry (S1)</td>
</tr>
<tr>
<td></td>
<td>Science Education</td>
<td>- Science Education (S1)</td>
<td>-</td>
</tr>
<tr>
<td>4. Faculty of Social Sciences (FIS)</td>
<td>Social and Political Science</td>
<td>- Pancasila and Civil Education (S1)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Pancasila and Civil Education (S2)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Geography</td>
<td>- Geography Education (S1)</td>
<td>- Geography (S1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Geography Education (S2)</td>
<td>- Long Range Sensor Technology (D3)</td>
</tr>
<tr>
<td></td>
<td>History</td>
<td>- History Education (S1)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Sociology</td>
<td>- Sociology Anthropology Education (S1)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Country Administration Science</td>
<td>- Country Administration Science (S1)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Country Administration Science (S2)</td>
<td>-</td>
</tr>
<tr>
<td>5. Faculty of Engineering (FT)</td>
<td>Civil Engineering</td>
<td>- Architectural Engineering Education (S1)</td>
<td>- Civil Engineering (D3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Civil Engineering (S1)</td>
<td>- Civil Engineering (S1)</td>
</tr>
<tr>
<td></td>
<td>Electrical Engineering</td>
<td>- Electrical Engineering Education (S1)</td>
<td>- Electricity Engineering (D3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Industrial Electrical Engineering (D4)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FACULTY &amp; DEPARTMENT</th>
<th>STUDY PROGRAM</th>
<th>EDUCATIONAL</th>
<th>NON-EDUCATIONAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronics Engineering</td>
<td>- Electronics Engineering Education (S1)</td>
<td>- Electronics Engineering (D3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Informatics and Computer Engineering Education (S1)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Mechanical Engineering</td>
<td>- Mechanical Engineering Education (S1)</td>
<td>- Mechanical Engineering (D3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Mechanical Engineering Education (S1)</td>
<td>- Mechanical Engineering (S1)</td>
<td></td>
</tr>
<tr>
<td>Automotive Engineering</td>
<td>- Automotive Engineering Education (S1)</td>
<td>- Automotive Engineering (D3)</td>
<td></td>
</tr>
<tr>
<td>Mining Engineering</td>
<td>- Mining Engineering (D3)</td>
<td>- Mining Engineering (S1)</td>
<td></td>
</tr>
<tr>
<td>Post-Graduate Programs</td>
<td>- Technology and Vocational Education (S2)</td>
<td>- Technology and Vocational Education (S2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Skills :</td>
<td>- Chief Information Officer (CIO)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Informatics Engineering Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Architectural Engineering Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Electrical Engineering Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Automotive Engineering Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Mechanical Engineering Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Electronics Engineering Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Family Welfare Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Technology and Vocational Education (S3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Skills :</td>
<td>- Chief Information Officer (CIO)</td>
<td></td>
</tr>
</tbody>
</table>
### B. Post-Graduate Programs (PPs)

<table>
<thead>
<tr>
<th>NO</th>
<th>STUDY PROGRAM</th>
<th>CONCENTRATION</th>
<th>DET</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>S2 Program (Magister)</td>
<td>- Anthropology/Sociology Education</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Social Sciences Education</td>
<td>- History Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Civil Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Art and Cultural Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Integrated Social Sciences Education</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Educational Technology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Environmental Science</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>S3 Program (Doctor)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Educational Science</td>
<td>Orientation :</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Educational Resource Development (PSDP)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Mathematics and Natural Science Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Social Science Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Indonesian Language and Literature Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- English Language Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Environmental Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Education Management</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Educational Technology</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Guidance and Counseling</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Environmental Science</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Institute for Research and Community Service (LP2M)

The Institute for Research and Community Service (LP2M) is an academic implementing element, which has the task of coordinating, implementing, monitoring, and evaluating research and community service activities who are directly responsible to the Chancellor. The Institute for Research and Community Service carries out the following functions:

a. Preparation of plans, programs, and budget of the Institution;
b. Implementation of pure and applied scientific research;
c. Implementation of community service;
d. Coordinating the implementation of research activities and community service;
e. Implementation of publication of research results and community service;

f. Implementation of cooperation in the field of research and community service with universities and/or other institutions both domestically and abroad;

g. Monitoring and evaluating the implementation of research activities and community service; and

h. Implementation of the Institution’s administrative affairs.

LP2M oversees several research and community service centers which are formed according to needs through the Chancellor’s Decree. Research Centers have a duty to carry out and coordinate the implementation of relevant research, monitor and evaluate research activities, especially for inter-field or multi-disciplinary research.

a. Center for Population and Environmental Research (PKLH)

The PKLH study center has the following scope of work:

- Research and assessment in the field of Population and the Environment
- Training and Consulting services in the field of Community related to the environment
- Seminars and workshops in the field of Population and Environment
- Promotion and expansion of attention to the environment

b. Gender Research Center (PPG)

The PPG study center has the following scope of work:

- Increase the capacity of human resources and institutions in managing gender-oriented education
- Carry out gender-oriented research by absorbing local religious and cultural values
- Develop research with a gender perspective in synergy with industry, research institutions, local governments, central and foreign governments
- Carrying out research based on gender perspective disaster mitigation mitigation
- Providing services to empower the poor, especially female heads of household.

c. Research Center for Religious Studies (PPPA)

The PPPA study center has the following scope of work:

- Religious Counseling / Da’wah
- Training on research methodology/writing scientific articles in the field of religion for PAI lecturers
- Training on the Development of Religious Learning Models for MDA teachers
- Training on rush writing methodology for PAI lecturers
- PBM training for MDA teachers
- Student Da’i Training (Peldama)
- Seminars and discussions on the dangers of drugs and promiscuity
- Conducting religious research in collaboration with religious institutions/organizations

d. Regional Development Research Center and Regional Autonomy

The PPPWOD study center has the following scope of work:

- Meta-evaluation research (special research) with regard to local government, especially in the field of services, development, policy, and community empowerment
- Training and consulting services in the field of capacity building, with regard to regional financial management, good governance, and regional potential development
- Organizing scientific activities such as seminars, panel discussions, book reviews etc.
- Assisting faculty in organizing proposal seminars, drafts of research results for teaching staff

e. Disaster Research Center (PPB)

The PPB study center has a scope of work offered, namely:

- Research in the field of reducing the risk of natural disasters such as earthquakes, tsunamis, volcanic eruptions, floods, droughts, hurricanes, and landslides
- Research in the field of non-natural disaster risk reduction such as failed technology, failed modernization, epidemics, and disease outbreaks
- Research in the field of reducing the risk of social disasters such as social conflicts between groups or between communities, and terror
- Services for the inventory and identification of areas prone to and risks of natural disasters, information systems for natural disaster mitigation and natural disaster mitigation technology mitigation
- Services for mapping disaster-prone areas and risks
- Services for disaster mitigation and management
- Services for professional services in the field of disaster risk reduction
- Seminars and workshops

f. Center for Legal and Human Rights Research

The PPH-HAM study center has the following scope of work:
- Assessment and research regarding: development policies, constitutional law, legislation, regional regulations, regional autonomy, geography, demographics, and natural resources
- Advocacy against human rights violations
- Mediation on non-litigation violations
- Seminars and discussions on various fields in development
- Conducting education and training on studies and research in the civil, political, economic and social fields
- Disseminate the conditions of national and regional development
- Establish cooperation with government and private institutions at the local, national and international levels in the context of developing community development
- Conducting development and communication with institutions institutions and intellectual communities that have an interest in development development, both at national and international levels
- Recommend study and research findings to relevant agencies.

g. Center for Public Management and Strategy Research

The PPMS study center has the following scope of work:
- Assessment and development of SMEs
- Entrepreneurship assessment and development
- Public policy review
- Preparation of the public sector strategic plan
- MSME Consultation
- Small entrepreneur training

In addition to the above research center which is managed by LP2M, it also has the task of planning, implementing and coordinating the practice of science, technology and art carried out by UNP directly to the community to accelerate the development process.

LP2M has the aim of (a) developing human resources towards the creation of human development and development towards the establishment of a learning community, (b) practicing knowledge and skills through continuous education in the community, (c) carry out services to the community in accordance with available capabilities and resources, and (d) carry out integrated activities of education, research and community service.

3. Institute for Learning Development and Quality Assurance (LP3M)

The Institute for Learning Development and Quality Assurance (LP3M) has the task of coordinating, implementing, monitoring, and evaluating activities for improving and developing learning and quality assurance of education. The Institute for Learning Development and Quality Assurance carries out the following functions:

a. preparation of plans, programs, and budget of the Institution;
b. implementation of improvement and development of learning;
c. implementation of the development of education quality assurance system;
d. coordination of the implementation of learning improvement activities, learning development, and education quality assurance;
e. monitoring and evaluation of learning improvement, learning development, and education quality assurance; and
f. implementation of the Institution's administrative affairs.

I. Administrative Executor

Implementation of university administration which includes the Bureau of Academic and Student Affairs (BAK), Bureau of Planning, Administration of Cooperation and Public Relations (BPAK-HM). Meanwhile, General Administration and Finance is held by the General and Finance Bureau (BUK). The Head of the Bureau is appointed by and reports directly to the Chancellor.

J. Supporting Element

The supporting elements at UNP in the form of the Technical Implementing Unit (UPT) are equipment in the fields of education and teaching, research, and community service outside the faculties, departments and study programs, laboratories, workshops, and studios.

1. UPT Library

According to PP No. 24 th 2014 library is an institution that manages the collection of written works, printed works, and/or recorded works in a professional manner with a standard system to meet the educational, research, preservation, information, and recreational needs of the users. College Library is a library which is an integral part of education, research and service activities.
to the community and serves as a learning resource center to support the achievement of educational goals domiciled in tertiary institutions. The library has the task of providing library material services for the purposes of education, research and community service. The library has the function of (a) providing and processing library materials, (b) providing services and utilization of library materials (c) maintaining library materials (d) performing reference services, and (e) carrying out library administration matters. The UPT Library of UNP consists of the central library, faculty reading room, departmental reading room and reading room at each PGSD UPP (Lubuk Buaya, Bandar Create, and Bukittinggi). Since 1994 this UPT Library has been occupying a new five-story building with an area of about 5000 m². In this building there are several rooms which include: AVA, Librarian’s Work, film projection, binding, lecturer/postgraduate reading, internet room, main collection and student reading room. The library has been managed using a library information system, which provides digital library services (Digital Library) that can be accessed 24 hours a day through the website.

http://digilib.unp.ac.id

a. Reading Room Faculty/Department/UPP
This reading room in addition to serving students is also widely used by teaching staff in faculties/departments/study programs concerned.

<table>
<thead>
<tr>
<th>Day</th>
<th>hit</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday, Thursday</td>
<td>07.30 to 12.00 WIB</td>
<td>(Pray Break)</td>
</tr>
<tr>
<td></td>
<td>12.00 to 13.30 WIB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>13.30 to 16.00 WIB</td>
<td></td>
</tr>
<tr>
<td>Friday</td>
<td>07.30 to 11.45 WIB</td>
<td>(Pray Break)</td>
</tr>
<tr>
<td></td>
<td>11.45 to 14.00 WIB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>14.00 to 15.30 WIB</td>
<td></td>
</tr>
<tr>
<td>Saturday</td>
<td>07.30 to 12.00 WIB</td>
<td></td>
</tr>
<tr>
<td>Sunday</td>
<td>09.00 to 13.00 WIB</td>
<td></td>
</tr>
</tbody>
</table>

2. Information and Communication Technology Development Unit
The development of Information and Communication Technology supports data automation in developing management information systems in academics and other fields. The use of networks based on Local Area Network (LAN)/Intranet and Wide Area Network (WAN)/ Internet equipped with fiber optic cable is expected to make the computerization process more integrated, simultaneous and can be accessed more widely by the UNP academic community. Starting in 2006 the payment system has been developed host to host between UNP and Bank Nagari (on line) which provides convenience to students in the process of paying tuition fees. This system has been further developed to include the payment of the Mandiri Regular New Student Admission, the payment of the graduation fee, the payment for the acceptance of new students for Diploma III and Postgraduate Faculty of Engineering, UNP. The same year also launched the official website of the State University of Padang (http://www.unp.ac.id) and Universitas Negeri Padang Webmail (http://webmail.unp.ac.id). In 2008, all new student registration processes, academic administration management of study programs, academic portals, library information systems and digital libraries also began to be implemented routinely on line. Student registration (http://prasireg.unp.ac.id) is an application for new student registration so that the registration process is more effective with more accurate data because it is carried out by the person concerned. Academic Information System is an application for the management of department/study program management, especially regarding class schedules. With this application, each study program can determine its own course schedule along with the rules for taking the courses offered each semester. This application can only be accessed from the UNP internal network (intranet). Access for students and lecturers can be done through the Academic Portal (http://portal.unp.ac.id). Lecturer byon line can find out what courses are taught in the current semester, class participants and enter student grades at the end of the semester, while online students can fill out study plan cards (KRS), view study results (LHS), interact with students and lecturers throughout the university through discussion forums. The academic portal is being upgraded to function as an interactive learning facility between course lecturers and the students they care for.
At the end of 2012, an online Electronic Learning System has been developed (http://elearning.unp.ac.id) which can be used for distance learning and electronic journaling (http://ejournal.unp.ac.id) to upload journals electronically for lecturers and students. The use of this information system is in line with the provision of infrastructure that is always improved, such as:

1. New rooms and equipment for the data center (starting at the end of the year 2013)
2. Blade Server with 3 units of dual xeon quad core servers with 32 GB of memory each with a capacity that can be increased to 14 server units with the latest technology, tower type servers with intel xeon technology and sufficient memory with a total of more than 10 units.
3. Backup storage with a capacity of up to 10 TB as the main and backup data container.
4. 3 OMR machines with a speed of 3,500 sheets per hour as a means of data input and examination examination using computer exam answer sheets (LJK).
5. Network with 10 gigabit fiber optic technology and type N wireless hotspot that can be accessed from inside and outside the fresh water UNP campus with a radius of 10 KM (continuing to be improved so that it can be accessed from all corners of the city of Padang by students, lecturers and administrative staff).
6. Teleconference room used for distance learning services, meetings with other departments and universities in Indonesia that are connected to INHERENT (Indonesian Higher Education Network) through the national education network (Jardiknas).

3. Language Technical Implementation Unit

UPT Language is a support unit that organizes academic service activities for the entire academic community and the community in the form of training or foreign language courses such as English, Japanese, Arabic, German, and Mandarin.

The course is provided for all levels from children, youth, and adults. This unit also provides linguistic-related services such as translation and interpreter, escort for foreign guests, foreign language proficiency test (TOEFL, TOEIC, IELTS, Japanese test), thesis/thesis/dissertation and book editing and training for language instructors.

4. UPT Services and Counseling Guidance (UPBK)

UPBK has the task of providing consulting services to lecturers, students, employees, and the community. The services provided by UPBK are generally focused on UNP students. The services provided are academic and non-academic services in order to help UNP students achieve academic success, career planning success, and social success (trisuccess).

In dealing with academic and social demands, students are faced with various problems whose solutions often require the help of a counselor. These problems include, among others, personal, social, learning, economic problems, young people’s relationships, marriage and other problems that interfere with the smooth and successful learning. These services are provided by counselors who are experts in their fields, according to the type and nature of the problems experienced. Students can directly or through PA meet with a counselor, but it is better to make an appointment beforehand.

5. International Service UPT

UPT International Services has the task of facilitating international cooperation, services for students, educators, and foreign education personnel, as well as international promotion of UNP.

In carrying out the tasks as referred to in Article 118, UPT International Services carries out the following functions: (a) implementation of the preparation of plans, programs and budgets for UPT; (b) the development of UNP international cooperation; (c) facilitation of international cooperation; (d) implementation of services for students, educators, and foreign education personnel; (e) implementation of the university's international promotion; (f) coordination of UNP’s international cooperation program implementation; (g) monitoring and evaluation of UNP's international cooperation program; and (h) implementation of UPT administrative affairs.

6. UPT Career Development and Entrepreneurship

UPT Career Development and Entrepreneurship has the task of carrying out career development and entrepreneurship within UNP. In carrying out the tasks referred to, the UPT for Career Development and Entrepreneurship carries out the following functions: (a) implementation of the preparation of plans, programs, and budgets, (b) implementation of career development and entrepreneurship, (c) implementation of the administration of career development and entrepreneurship activities, and (d)
implementation of administrative affairs of UPT Career Development and Entrepreneurship.

7. Laboratory/Workshop
The laboratory/workshop is a supporting facility in order to provide services and train students' skills in strengthening theory and practice. These types of laboratories/workshops are available in each faculty according to their respective departments and study programs. Detailed information regarding labor/workshop/studio can be seen in each faculty.

8. Campus Health Unit (UKK)
   a. UKK's duties are:
      1) Providing health services to the academic community
      2) Provide medication/care for maternal and child health, nutrition, hygiene, immunization and family planning.
   b. Service Schedule
      Treatment and care for the sick is held every working day except Friday. Examination of pregnant women, control of healthy children, nutrition instructions for children's food are held every Thursday. Family planning services/consultation are held every working day starting at 11.00 WIB except Friday.

9. Student Activity Center (PKM)
   Student activity center (student center) is a place of activity in an effort to foster and develop student activities related to reasoning, talents/interests, welfare and is also a communication and information forum for all co-curricular activities including student organizations. All student activities in the form of discussions, seminars, workshops, leadership training and others can be accommodated in PKM.

10. Employment Service Center (PJK)
    The Employment Service Center provides information and assistance to students in the field of employment. This information and assistance includes:
    a. provide information about available job opportunities
    b. identify graduate qualifications required by the job market
    c. help student career development
    d. seek additional skill training
    e. establish cooperative relationships with relevant departments and agencies in terms of employment

    UNP Publishers endeavor to publish the works of lecturers in the form of textbooks, lecture requirements, research reports, as well as articles from the UNP Education Forum and Bulletin, Ganto, and Learning.

12. Sports Facilities
    The available sports facilities and infrastructure can accommodate the sports activities of students, lecturers and employees outside of class hours. Currently there are 3 sports buildings consisting of basketball courts, volleyball, badminton, handball, sepak takraw, table tennis and gymnastics. Three football fields, athletic track and four tennis courts as well as fitness training facilities and an indoor swimming pool.

13. Civil Servant Cooperative
    Padang State University Cooperative has a legal entity Number 1027/BH-XVII dated October 28, 1992. Padang State University Cooperative aims to improve services to members in the form of goods and services.

    Padang State University Cooperatives organize savings and loan business activities, shops, photocopying, suppliers of office stationery, and consultants.

14. Student Cooperative (KOPMA)
    KOPMA is an academic support facility for UNP students. KOPMA is not only intended as a place for developing skills to carry out practical organizational activities in a business manner, but also as a forum for fostering the younger generation to realize the ideals of cooperatives.

15. Student Dormitory
    Students who are allowed to occupy dormitories are students who have met the criteria set by the Chancellor. The student dormitories are scattered in various places, namely: 1) AirTawar Padang central campus, 2) UPP II PGSD in Lubuk Buaya, 3) UPP III PGSD in Bandar Create, 4) UPP IV PGSD in Bukittinggi. How to get the opportunity to occupy a dormitory can be asked to the Student Affairs Section of BAK.
This agency aims to help improve the progress of the institution and well-being civitas academic with strive sources beyond the budgeted funds.

17. Mosque
Inside the campus there is the Al-Azhar Mosque which in addition to praying and religious activities is also used for Islamic religious lectures as well as the Moral and Moral Laboratory.

18. Campus Security
Campus security is handled by the campus security unit (SATPAM), which is on duty 24 hours. This Security Unit is equipped with a 2 meter radio communication with a frequency of 143,400 MHz. If there are emergency matters or/and important issues/important information regarding the campus and the academic community, they can immediately contact the SATPAM through that frequency. Security guard posts are scattered in several places on campus.

K. Students and Student Organizations
Students are students who are registered and studying at UNP in accordance with the provisions of the applicable laws and regulations. To carry out the improvement and development of talents, interests, reasoning, knowledge and welfare, community service and activities college student other, formed organization student that organized from, by, and for students.

1. Student Organization at University Level
a. Student Representative Council (MPM)
The Student Representative Council is a normative part of the University level whose duties are:
1) draw up an outline of the student activity program (GBPK) at the University level
2) lifting and dismissing BEM
3) supervise and direct BEM in implementing (GBPK)
b. Student Executive Board (BEM)
The Student Executive Board is a forum for student development at the university level, for the development of reasoning, interests and talents as well as student welfare.

2. Student Organization at the Faculty level
a. Faculty Student Representative Body (BPMF)
The Faculty Student Representative Body is a normative body at the faculty level as a forum that supports student activities in terms of welfare, interests/talents and reasoning development. BPMF members are representatives who are directly elected by students from candidates who are supported by at least 10 students and approved by the Dean. The requirements to become a member of BPMF are (a) having integrity, personality and noble character and (b) having high learning achievement while following the previous education level.

b. Faculty Student Executive Board (BEMF)
The Student Executive Board is a forum for student development at the faculty level for the development of students’ individual reasoning strengths (ideas and reasoning) as well as a place to channel students’ talents and interests.

c. Student Activity Unit Semi-Autonomous Body (BSO-UKM)
This Agency is under BEMF which is in charge of developing and increasing creativity in carrying out scientific activities, interests and talents, as well as planning, implementing, and evaluating activities in accordance with their respective fields.

3. Student Organization at the Department level
At the department level, the Department of Student Association (HMJ) is formed which is tasked with assisting coaching, reasoning, talent and welfare department student.

L. List of Leaders, Expert Staff and University Senate
1. University Leader

Rector : Prof. Ganefri, Ph.D.
Vice Chancellor I : Prof. Dr. Yunia Wardi, Drs, M.Si (Academic Field)
Vice Chancellor II : Drs. Syahril, ST, M.Sc, Ph.D (General Planning and Finance) Vice Chancellor III : Prof. Dr. Ardipal, M. Pd (Student and Alumni Sector) Vice Chancellor IV : Prof. Dr. Syahril BM Pd (Cooperation and Information Systems Sector)
2. Expert Staff

Chancellor’s Expert Staff
1) Aldri Frinaldi, SH, M. Hum, Ph.D
2) Dr. Muhammad Anwar, S.Pd, MT

Expert Staff of the Vice Chancellor I
1) Alizar, S.Pd, M.Sc, Ph.D
2) Abor, SE, ME, Ph.D

Expert Staff of the Vice Chancellor II
1) Drs. Revian Body, M.SA
2) Risma Apdeni, ST, MT

Expert Staff of the Vice Chancellor III
1) Drs. Yulifri, M.Pd
2) Drs. Hasan Maksum, MT

Expert Staff of the Vice Chancellor IV
1) Drs. Jonni, M.Pd
2) Mohammad Isa Gautama, S. Pd, M. Si

3. Faculty Leader

Dean of the Faculty of Education Dean of the Faculty of Languages and Arts Dean of the Faculty of Mathematics and Natural Sciences Dean of the Faculty of Social Sciences Dean of the Faculty of Engineering Dean of the Faculty of Sports Science Dean of the Faculty of Economics Dean of the Faculty of Tourism and Hospitality: Dr. Ernawati, M.Pd. Postgraduate Program Director: Dr. Yenni Rozimela, M.Ed, Ph.D

4. Institutional Leader

a. Research institutions and community service
Chairman: Prof. Dr. Rusdinal, M.Pd

b. Institute for Learning Development and Quality Assurance
Chairman: Dr. Edwin Musdi, M.Pd

5. Bureau Chief

Head of BAK: Drs. Yushamdi
Head of BUK: Afdalisma, SH, M.Pd.
Head of BPAKHM: Drs. Ahmad Hamdani, MM

6. Central and Unit Leaders

a. BLU Business Unit Management Agency
   Head: Prof. Dr. Yasri, MS

b. LP2M Research Center
   Head: Drs. Syamsir, M. Si, Ph.D

c. LP2M Service Center
   Head: Dr. Elfi Tasrif, MT

d. LP3M Learning Development Center
   Head: Dr. Zul Amri, M. Ed

e. LP3M Quality Assurance Center
   Head: Dr. M. Giatman, M. SIE

f. Field Experience Program Center
   Head: Dr. Waskito, MT

g. UPT Career Development and Entrepreneurship
   Head: Dra. Asmar Yulastri, M.Pd, Ph.D

h. UPT Language
   Head: Dra. An Fauzia Rozani Syafei, MA

i. Library UPT
   Head: Dr. Ardoni, M. Si

j. UPT PTIK
   Head: Drs. Aswardi, MT

k. Counseling Guidance Service Unit
   Head: Dr. Yarmis, M.Pd., Kons

7. University Senate

Chairman: Prof. Dr. Z. Mawardi Effendi, M.Pd
Secretary: Prof. Dr. Sufyarma Marsidin, M.Pd
Member: Prof. Ganeefri, Ph.D
Prof. Dr. Yunia Wardi, M.Si
Ir. Syahrial, ST, M.Sc, Ph.D
Prof. Dr. Ardiyal, M.Pd
Prof. Dr. Syahrial Bakhtiar, M.Pd
Prof. Dr. Rusdinal M.Pd
Dr. Edwin Musdi, M.Pd
Prof. Yenni Rozimela, M.Ed, Ph.D
Prof. Dr. Lufri, MS
Prof. Dr. Ahmad Fauzan, M, Pd, M.Sc
Prof. Dr. Festiyed, MS
Prof. Dr. Elizar, M.Pd
Prof. Dr. Minda Azhar, M.Si
Drs. Hendra Syarifuddin, M.Si, Ph.D
Dr. Irwan, M. Si
Dra. Hj. Heffi Alberida, M.Si
Dr. Yuni Ahda, S.Si, M.Si Dr.
Yulkifli, S.Pd, M.Si Dr. Indang
Dewata, M. Si Dr. Fahmi Rizal, M.Pd, MT
Prof. Dr. Nizwardi Jalinus, M.Ed
Drs. Bahrul Amin, ST, M.Pd Dr.
M. Giatman, M. SIE
Dr. Nurhasan Syah, M. Pd
Oriza Candra, ST, MT Dr.
Usmeldi, M. Pd
Drs. Putra Jaya, MT
Dr. Muhammad Anwar, S.Pd, MT
Dr. Hasan Maksum, MT
Drs. Raimon Kopa, MT
Dr. Zalfendi, M.Kes
Prof. Dr. Phil. Yanuar Kiram
Prof. Dr. Eddy Marheni, M.Pd
Prof. Dr. Syafruddin, M.Pd
Prof. Dr. Eri Barlian, M.Kes
Oriza Candra, ST, MT
Prof. Dr. Alnedral, M.Pd
Dr. Bafirman HB, M. Kes, AIFO
Dr. Didin Tohidin, M.Kes, AIFO
Dr. Wilda Welis, SP, M.Kes Dr.
Alwen Bentri, M.Pd
Prof. Dr. Jamaris Jamna, M.Pd
Prof. Dr. Firman, MS. Cons of
Prof. Dr. Mega Iswari, M.Pd Prof.
Dr. Rakimahwati, M.Pd
Prof. Drs. Yalvema Miaz, MA, Ph.D Dr.
Alizamar, M. Pd, Kons
Dr. Fetri Yeni J, M.Pd
Dr. Hadiyanto, M.Ed
Drs. Muhammadi, S.Pd, M.Si
Prof. Dr. M. Zaim, M. Hum
Prof. Dr. Mukhairyar, M.Pd
Prof. Dr. Hasanuddin WS, M. Hum
Prof. Dr. Atmazaki, M.Pd
Dr. Zul Amri, M.Ed
Prof. Dr. Hermawati Syarif, M. Hum
Prof. Dr. Widyawati Syarif, M. Hum
Dr. Yahya, M.Pd
Drs. Yusron Wikarya, M.Pd
Indrayuda, S.Pd, M.Pd, Ph.D

Drs. Wimbrayardi, M.Sn
Prof. Dr. Syafri Anwar, M.Pd
Prof. Dr. Azwar Ananda, MA
Prof. Drs. Dasman Lanin, M. Pd, Ph.D
Drs. Suryanef, M. Si
Drs. Ikhwan, M. Si
Dr. Siti Fatimah, M.Pd., M.Hum
Drs. Zafri, M.Pd
Dr. Yurni Suasti, M.Si
Junaidi, S.Pd., M.Si
Drs. Syamsir, M.Sc., Ph.D
Dr. Dedi Hermon, MP Dr.
Idris, Drs., M.Si
Prof. Dr. Agus Irianto
Prof. Dr. Syamsul Amar, MS
Prof. Dr. Bustari Muchtar
Prof. Dr. Yasri, MS
Dr. Susi Evanita, MS
Dr. Efrizal Syofyan, SE., M.Sc., Ak
Drs. Ali Anis, MS
Erni Masdupi, SE., M.Sc., Ph.D
Sany Dwita, SE., M.Sc., Ak., Ph.D
Dr. Ernawati, M.Pd, Ph.D
Prof. Dr. Agusti Efi, MA
Dra. Asmar Yulastri, M.Pd., Ph.D
Dra. Rahmati, M.Pd, Ph.D Dra.
Adriani, M.Pd
Dra. Wirnelis Syarif, M.Pd
Dra. Hayatunnuful, M.Pd
Murni Astuti, S.Pd., M.Pd.T
Dra. Ira Meirina Chair, M.Pd
Dr. Yuliana, SP., M.Si
Waryono, S.Pd., MM. Par
CHAPTER III
CURRICULUM

The Higher Education Curriculum is a set of plans and arrangements regarding the content, study/lesson materials as well as the delivery and assessment methods which are used as guidelines for the implementation of teaching and learning activities in higher education. Starting from the 2003/2004 academic year, Padang State University implemented a new curriculum in accordance with the Decree of the Minister of National Education No. 232/U/2000 and Decree of the Minister of National Education No.045/U/2002 concerning Guidelines for the Preparation of Higher Education Curriculum and Assessment of Student Learning Outcomes. These two Ministerial Decrees indicate the application of a Competency-Based Curriculum in Higher Education.

Competency-Based Curriculum (KBK) is a curriculum designed based on studies competencies that must be possessed by students after completing his studies in a program. So competence is a set of intelligent actions, full of responsibility, that a person has as a condition to be considered capable by the community in carrying out tasks in certain fields of work. Competence includes knowledge, skills, and abilities that can be learned and developed by a person including behavior in developing satisfying cognitive, affective and motor aspects.

In the 2014/2015 academic year, Padang State University implemented a new curriculum in accordance with the Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 73 of 2013 concerning the Implementation of the National Qualifications Framework for Higher Education. Framework Indonesian National Qualifications, hereinafter abbreviated as KKNI, is a competency qualification framework that can juxtapose, equalize, and integrate between the education sector and the field of job training and work experience in order to provide recognition of work competencies in accordance with the work structure in various sectors. KKNI is the embodiment of the quality and identity of the Indonesian nation in relation to system in national education and training owned by Indonesia.

A. MuUniversity course

1. MuUniversity Compulsory Tuition

<table>
<thead>
<tr>
<th>No.</th>
<th>MK code</th>
<th>Compulsory Courses University</th>
<th>credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>UNP1.60.1401</td>
<td>Religious education</td>
<td>3</td>
</tr>
<tr>
<td>2.</td>
<td>UNP1.60.1402</td>
<td>Pancasila Education</td>
<td>2</td>
</tr>
<tr>
<td>3.</td>
<td>UNP1.60.1403</td>
<td>Civic education</td>
<td>2</td>
</tr>
</tbody>
</table>

2. MuUniversity Preferred Course

<table>
<thead>
<tr>
<th>No.</th>
<th>MK code</th>
<th>Elective courses University</th>
<th>credits</th>
<th>Note.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>UNP2.50.2102</td>
<td>Multicultural Education</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>UNP2.60.2101</td>
<td>Fitness Education Physical</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>UNP2.60/2402</td>
<td>Disaster Management</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>UNP2.60.3401</td>
<td>Natural Culture Minangkabau</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>UNP2.60.3402</td>
<td>Information Technology and Communication</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>UNP2.60/2102</td>
<td>Japanese</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>UNP2.50.2401</td>
<td>History of the Struggle Indonesian nation</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>UNP2.50.1401</td>
<td>Social and Cultural Sciences Basic</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>UNP2.50.1402</td>
<td>Basic Natural Science</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

| amount | 18 | 2 |

3. MuUniversity Compulsory Education Course

<table>
<thead>
<tr>
<th>No.</th>
<th>MK code</th>
<th>Compulsory Courses Education University</th>
<th>credits</th>
<th>Description an</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>UNP1.61.1201</td>
<td>Fundamentals of Science Education</td>
<td>2</td>
<td>Semester 1 or 2</td>
</tr>
<tr>
<td>2.</td>
<td>UNP1.61.2102</td>
<td>Administration and Education Supervision</td>
<td>2</td>
<td>Semester 2 or 3</td>
</tr>
<tr>
<td>3.</td>
<td>UNP1.61.2101</td>
<td>Educational Psychology</td>
<td>2</td>
<td>Semester 3 or 4</td>
</tr>
<tr>
<td>4.</td>
<td>UNP1.61.4201</td>
<td>Counseling Guidance</td>
<td>2</td>
<td>Semester 4 or 5</td>
</tr>
<tr>
<td>5.</td>
<td>UNP1.61.5101</td>
<td>Field Practice</td>
<td>1</td>
<td>Semester</td>
</tr>
</tbody>
</table>
B. Credit Load by Education Level

<table>
<thead>
<tr>
<th>Educational level</th>
<th>Credit load</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diploma II</td>
<td>72 to 90</td>
</tr>
<tr>
<td>Diploma III</td>
<td>108 to 120</td>
</tr>
<tr>
<td>Bachelor and Diploma IV</td>
<td>144 to 158</td>
</tr>
<tr>
<td>Profession</td>
<td>minimum 36</td>
</tr>
<tr>
<td>Master's Program</td>
<td>minimum 46</td>
</tr>
<tr>
<td>Doctoral Program</td>
<td>minimum 52</td>
</tr>
</tbody>
</table>

C. Course Codes and Meaning of Course Codes

1. Course Code
   a. The course code consists of 10 digits divided into three segments separated by a period (.).
   b. The first segment of the course code consists of four digits, the first three digits are capital letters according to the abbreviation of the University, Faculty, or Study Program (Prodi) that owns the course. For example UNP means university courses, FBS means Faculty of Languages and Literature courses and IND means Indonesian Language Department/Programme courses.
   c. The second segment consists of two digits
      1) The first digit indicates the IQF level, namely D3 = 5, S1=6, S2=8, and S3=9.
      2) The second digit uses the number 0, 1, or 2 which indicates the study program group. For Study Program

<table>
<thead>
<tr>
<th>No.</th>
<th>MK code</th>
<th>Compulsory Courses Education University</th>
<th>credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.</td>
<td>UNP1.61.6401</td>
<td>Field Practice School 2 (PLP2)</td>
<td>1</td>
<td>Semester 6</td>
</tr>
<tr>
<td>7.</td>
<td>UNP1.61.7401</td>
<td>Field Practice School 3 (PLP3)</td>
<td>3</td>
<td>Semester 7</td>
</tr>
<tr>
<td>8.</td>
<td>UNP1.61.2103</td>
<td>Philosophy of Education</td>
<td>2</td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

amount 13

Note: PLP1, PLP2, and PLP3 are managed by the Head of the Study Program and in collaboration with PPPL, LP3M UNP.

Education uses code 1, Non-Educational Study Programs use code 2, and if the courses are the same for both Study Programs use code 0.

d. The third segment consists of four digits
   1) The first digit uses numbers 1-8, indicating the semester in which the course is taken.
   2) The second digit is the code for the educational competency group
   3) The third and fourth digits are the serial numbers of the courses, according to the group of subjects (01 to 99).

e. The code for the faculty abbreviation is as follows. FIP = Faculty of Education
   FBS = Faculty of Languages and Arts
   FMA = Faculty of Mathematics and Natural Sciences
   FIS = Faculty of Social Sciences
   FTE = Faculty of Engineering
   FIK = Faculty of Sports Science
   FPP = Faculty of Tourism and Hospitality

f. The abbreviation code for the study program is as follows.

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Majors courses</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIP</td>
<td>Education administration</td>
<td>AIP</td>
</tr>
<tr>
<td></td>
<td>Special education</td>
<td>PLB</td>
</tr>
<tr>
<td></td>
<td>Education technology</td>
<td>ID card</td>
</tr>
<tr>
<td></td>
<td>Out-of-school Education</td>
<td>Pls</td>
</tr>
<tr>
<td></td>
<td>Guidance and Counseling</td>
<td>BDK</td>
</tr>
<tr>
<td></td>
<td>PGSD</td>
<td>GSD</td>
</tr>
<tr>
<td></td>
<td>PGPAUD</td>
<td>AUD</td>
</tr>
<tr>
<td></td>
<td>basic education</td>
<td>PDA</td>
</tr>
<tr>
<td></td>
<td>Psychological Counselor Professional</td>
<td>KDP</td>
</tr>
<tr>
<td></td>
<td>Education</td>
<td>PSI</td>
</tr>
<tr>
<td>FBS</td>
<td>Indonesian Language and Literature Education</td>
<td>ENG</td>
</tr>
<tr>
<td></td>
<td>Indonesian Literature</td>
<td>ENG</td>
</tr>
<tr>
<td></td>
<td>English Education</td>
<td>ING</td>
</tr>
<tr>
<td></td>
<td>Language and Literature</td>
<td>ING</td>
</tr>
<tr>
<td></td>
<td>Fine Arts Education</td>
<td>SRP</td>
</tr>
<tr>
<td>Faculty</td>
<td>Majors courses</td>
<td>Code</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>FMIPA</td>
<td>Dramatic Performance, Dance and Music</td>
<td>SEN</td>
</tr>
<tr>
<td></td>
<td>Information Science Library and Archives for Japanese Language Education</td>
<td>JPG</td>
</tr>
<tr>
<td></td>
<td>Music Education Visual</td>
<td>DKV</td>
</tr>
<tr>
<td></td>
<td>Communication Design</td>
<td>TAR</td>
</tr>
<tr>
<td></td>
<td>Dance Education</td>
<td>PII</td>
</tr>
<tr>
<td></td>
<td>Library and Information Science</td>
<td>IKB</td>
</tr>
<tr>
<td></td>
<td>Language Teacher Training</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mathematics</td>
<td>MAT</td>
</tr>
<tr>
<td></td>
<td>Biology</td>
<td>BIO</td>
</tr>
<tr>
<td></td>
<td>Physics</td>
<td>FIS</td>
</tr>
<tr>
<td></td>
<td>Chemistry</td>
<td>KIM</td>
</tr>
<tr>
<td></td>
<td>D3 Statistics</td>
<td>STK</td>
</tr>
<tr>
<td></td>
<td>Statistics S1</td>
<td>STA</td>
</tr>
<tr>
<td></td>
<td>Science Education</td>
<td>IPA</td>
</tr>
<tr>
<td>FIS</td>
<td>Pancasila Citizenship Education S1</td>
<td>civics</td>
</tr>
<tr>
<td></td>
<td>Citizenship Pancasila Education Masters</td>
<td>PKN</td>
</tr>
<tr>
<td></td>
<td>Degree in State Administration</td>
<td>IAN</td>
</tr>
<tr>
<td></td>
<td>Geography</td>
<td>GEO</td>
</tr>
<tr>
<td></td>
<td>History</td>
<td>SEJ</td>
</tr>
<tr>
<td></td>
<td>Sociology Education Anthropology</td>
<td>SOA</td>
</tr>
<tr>
<td></td>
<td>Islamic Religious Education Remote</td>
<td>PIE</td>
</tr>
<tr>
<td></td>
<td>Sensing Technology Civil</td>
<td>TPJ</td>
</tr>
<tr>
<td>FT</td>
<td>Engineering</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Electrical Engineering</td>
<td>ELO</td>
</tr>
<tr>
<td></td>
<td>Electrical engineering</td>
<td>ELL</td>
</tr>
<tr>
<td></td>
<td>Informatics and Computer Engineering</td>
<td>ICT</td>
</tr>
<tr>
<td></td>
<td>Mechanical Engineering</td>
<td>MES</td>
</tr>
<tr>
<td></td>
<td>Automotive Engineering</td>
<td>auto</td>
</tr>
<tr>
<td></td>
<td>Mining Engineering</td>
<td>TMB</td>
</tr>
<tr>
<td></td>
<td>Industrial Electrical Engineering</td>
<td>TEI</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Majors courses</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIK</td>
<td>Sports Education</td>
<td>por</td>
</tr>
<tr>
<td></td>
<td>Coaching Education</td>
<td>LED</td>
</tr>
<tr>
<td></td>
<td>Health Education and Recreation</td>
<td>KOR</td>
</tr>
<tr>
<td>FE</td>
<td>Economic Education</td>
<td>PDE</td>
</tr>
<tr>
<td></td>
<td>Management</td>
<td>MNJ</td>
</tr>
<tr>
<td></td>
<td>Accounting</td>
<td>ACT</td>
</tr>
<tr>
<td></td>
<td>Economic development</td>
<td>EKO</td>
</tr>
<tr>
<td></td>
<td>Tax Management</td>
<td>CHD</td>
</tr>
<tr>
<td></td>
<td>Environmental Studies and Family</td>
<td>EKO</td>
</tr>
<tr>
<td>FPP</td>
<td>Welfare Development</td>
<td>KKE</td>
</tr>
<tr>
<td></td>
<td>Hotel management</td>
<td>FOLDER</td>
</tr>
<tr>
<td></td>
<td>Education Cosmetology and Beauty</td>
<td>TRK</td>
</tr>
<tr>
<td></td>
<td>Catering</td>
<td>BOG</td>
</tr>
<tr>
<td></td>
<td>Fashion</td>
<td>bus</td>
</tr>
</tbody>
</table>
CHAPTER VI
FACULTY OF MATHEMATICS AND IPA

A. Vision, Mission and Objectives of the Faculty.

1. Vision
Making the Faculty of Mathematics and Natural Sciences in 2020 an institution that produces MIPA educators and scientists who are superior, professional, have high academic culture and have character based on faith and piety.

2. Mission
a. Provide excellent service in the implementation of MIPA education and MIPA development to produce MIPA educators and scientists who are superior, professional, have high academic culture and have character based on faith and piety.
b. Increase the quantity and quality of research in the MIPA and MIPA education fields and fields relevant to MIPA.
c. Increase the quantity and quality of community service in the MIPA and MIPA education fields and fields relevant to MIPA.
d. Increase the quantity and quality of cooperation with various government and private institutions both at home and abroad for the advancement of FMIPA and MIPA education both locally, nationally and internationally.
e. Improving the governance of FMIPA institutions.

3. Purpose
Produce Bachelors who:
a. Having the characteristics of being a citizen as reflected in the National Education Goals.
b. Have a foundation of thinking and broad insight about Mathematics and Natural Sciences as a group of fields of study so that they are able to communicate in the field of Mathematics and Natural Sciences between each other and are able to connect the material in the field of study they teach with material in other Mathematics and Natural Sciences.
c. Mastering MIPA knowledge comprehensively, which is steady and deep enough so that graduates can develop and adapt to various situations and advances in science and technology.
d. Have broad knowledge about Mathematics and Natural Sciences and education and have adequate abilities and skills in designing, implementing, and managing teaching and learning activities in their field of study, and

e. Have additional authority/ability both horizontally and vertically.

B. Faculty Academic Information
FMIPA UNP has four majors, each of which consists of two study programs with education levels of D3, S1 and S2 programs, which are as follows:

1. Department of Mathematics, consisting of:
a. Mathematics Education Study Program
b. Mathematics Study Program
c. Statistics Study Program
2. Department of Biology, consisting of:
a. Biology Education Study Program
b. Biology Study Program
3. Department of Physics, consisting of:
a. Department of Physics Education
b. Physics Study Program
4. Department of Chemistry, consisting of:
a. Chemistry Education Study Program
b. Chemistry Study Program

5. Natural Science Education Study Program

In addition to managing regular programs, FMIPA also manages regular independent programs, including:
1. Educational study program whose students come from high school.
2. Qualification improvement program for junior and senior high school teachers to obtain a bachelor's degree in education.
3. Other special programs in the form of Upgrading/Short-term training for Mathematics and Science teachers at SMP/Madrasah Tsanawiah, SMU/Madrasah Aliah, both public and private.

Detailed explanations of these programs can be found in the respective program's manuals.

C. TPB Course

In accordance with curriculum developments based on the needs of each department, all new FMIPA students are required to take courses that are part of the TPB course group, according to their respective majors as listed in the following table.

<table>
<thead>
<tr>
<th>No.</th>
<th>Code</th>
<th>Courses</th>
<th>Credit</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>FMA1.60.1302</td>
<td>Calculus</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>FMA1.60.1303</td>
<td>General Physics</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>FMA1.60.2102</td>
<td>General Biology</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>FMA1.60.2103</td>
<td>General Chemistry</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>

The implementation of the TPB course group lectures is arranged under the coordination of the TPB Course Service Unit with each department in the Faculty of Mathematics and Natural Sciences, Padang State University.

D. Academic Information at Department Level

1. Mathematics Department

a. Vision

Making the Mathematics Department of FMIPA UNP a center for mathematics education, research, and development in order to produce professional, faithful, devoted and reputable academic staff and scientists at the national and international levels.

b. Mission

The mission of the Mathematics Department of FMIPA UNP is to improve:

1) faith and devotion to God Almighty
2) noble character, discipline, and a sense of responsibility
3) conducive academic climate
4) the quality of graduates of education staff and scientists
5) role as facilitator of lifelong learning
6) graduates who are able to communicate effectively with community members
7) cooperation with other parties in the field of research, and community service
8) mathematics research and teaching activities to support the process of learning, developing, and applying mathematics
9) supporting activities grounding mathematics, so that the impression of people who think that the difficulty of mathematics can be minimized.

c. Destination

The objective of the Mathematics Department of FMIPA UNP is to produce graduates who have competitive and comparative advantages according to national and international quality standards.
d. Study Load

To complete undergraduate education in Mathematics, students are required to have passed courses of at least 144 credits which include compulsory courses (127 credits for the Mathematics Education study program, 117 credits for the Mathematics study program) and elective courses and specifically for the Statistics study program the study load only includes compulsory courses consisting of 115 credits.

1) Compulsory Courses

Compulsory courses consist of courses – courses that every student must take. To take a course certain conditions are required (pre-request, or other conditions). This should be the attention of students.

2) Elective Courses

Students are free to choose elective courses that are available each semester. However, so that students have an adequate unit of ability, in choosing elective courses, students are expected to consult and pay attention to the suggestions of academic supervisors.

e. Study program

The Mathematics Department of FMIPA UNP has four study programs, namely the Mathematics Education study program, the Mathematics study program, the Statistics program (S1) and the Statistics study program (D3).

Study Program : Mathematics Education (S1)

1) Vision

Making one of the superior study programs at the national level in producing mathematics educators in 2020 based on faith and piety.

2) Mission

The missions of the Mathematics education study program at FMIPA UNP are:

a) Develop innovative learning activities based on faith and piety

b) Carrying out research oriented to mathematics learning innovation

c) Organizing community service activities

d) Develop cooperation with various stakeholders

3) Purpose

The objectives of the Mathematics education study program at FMIPA UNP are:

Produce a Bachelor of Mathematics Education who has professional, pedagogic, personality and social competencies based on faith and piety

a) Produce graduates who are able to compete at the national level

b) Produce scientific papers with national reputation in developing mathematics learning

c) Providing services to the community in the field of mathematics education in accordance with the progress of science and technology

4) Graduate Competencies

Competencies of graduates of the Mathematics Education Study Program of FMIPA UNP can be formulated as follows:

1. Competence in the Field of Work

a. Mastering learning theory, principles of learning mathematics, and student characteristics

b. Skilled in developing mathematical abilities, high-level mathematical thinking, and positive attitudes of students towards mathematics

c. Have the ability to use information and communication technology for self-interest and for learning Mathematics

d. Skilled in evaluating the process and results of learning mathematics and using it for the benefit of learning mathematics

e. Have a work ethic, empathy, responsibility, self-confidence, and a sense of pride as a math teacher

f. Able to communicate effectively and politely with fellow educators, education staff, parents and the community
2. Knowledge Mastery Competence
Able to think deductively, inductively, logically, analytically and structured in understanding Learning and Learning methods and theories so that they can apply them correctly.

3. Managerial Ability:
a. Able to communicate and cooperate with community members.
b. Able to negotiate with applied field practitioners.

4. Attitudes and Values:
a. Understanding the values of character, science, and life nation and state.
b. Able to carry out work honestly, disciplined, and responsible.
c. Able to act ethically and morally.

5) Course Structure
Major: Math
Study program: Mathematics Education (S1)

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>T</th>
<th>P</th>
<th>L</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UNP1.60.2101</td>
<td>Entrepreneurship</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>UNP1.61.1201</td>
<td>Fundamentals of Educational</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>UNP1.61.2101</td>
<td>Psychology Education</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>UNP1.61.2102</td>
<td>Education Administration And Supervision</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>UNP1.61.4201</td>
<td>Guidance and counseling</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>

4). University Elective Courses
A. Choose 2 of 18 Credits

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>T</th>
<th>P</th>
<th>L</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UNP2.60.1401</td>
<td>Basic Natural Science</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>UNP2.60.1402</td>
<td>Basic Socio-Cultural Sciences</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>UNP2.60.2101</td>
<td>Physical Fitness Education</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>UNP2.60.2102</td>
<td>Japanese</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>UNP2.60.2103</td>
<td>Multicultural Education</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>UNP2.60.2401</td>
<td>History of the Indonesian Nation's Struggle</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

5). Faculty Compulsory Courses
A. Required

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>T</th>
<th>P</th>
<th>L</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UNP2.60.1201</td>
<td>General biology</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>UNP2.60.1101</td>
<td>General Chemistry</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

6). Study Program Compulsory Courses
A. Required

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>T</th>
<th>P</th>
<th>L</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MAT1.61.1101</td>
<td>Computer application</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>MAT1.61.1301</td>
<td>Introduction to Basic Mathematics</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>MAT1.61.1302</td>
<td>Basic Algebra and Trigonometry</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>MAT1.61.2301</td>
<td>Advanced Calculus</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>MAT1.61.2302</td>
<td>Field and Space Geometry</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>MAT1.61.3301</td>
<td>Analytical Geometry of Planes and Room</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>MAT1.61.3302</td>
<td>Elementary Statistics</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>MAT1.61.3303</td>
<td>Learning Psychology</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>
### 7. Study Program Elective Courses

#### A. Maximum Choice of 3 Credits from 14 Credits

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MAT2.61.6011</td>
<td>Transformation Geometry</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>MAT2.61.6102</td>
<td>History of Mathematics</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>MAT2.61.6103</td>
<td>Actuarial</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>MAT2.61.6104</td>
<td>Numerical Method</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

#### B. Choose Minimum 4 credits from 34 credits

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MAT2.61.8101</td>
<td>Multivariate Analysis</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>MAT2.61.8102</td>
<td>Finite Group Theory</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>MAT2.61.8103</td>
<td>Introduction to Topology</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>MAT2.61.8104</td>
<td>Math Statistics 2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>MAT2.61.8105</td>
<td>Database Complex Variable</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>MAT2.61.8106</td>
<td>Function Theory</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>MAT2.61.8201</td>
<td>Mathematical Modeling</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>MAT2.61.8202</td>
<td>Real Analysis 2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>MAT2.61.8301</td>
<td>Applied Regression Analysis</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

#### Synopsis

**UNP.60.1401 Religious Education 3 Credits**

The One and Only Godhead: faith and piety, divine philosophy (Theology); Humans: human nature, human dignity, human responsibility; Law: raise awareness to obey God's law, the prophetic function of religion in law: Moral: religion as a source of morals, morals in life; Science, Technology and Arts: Faith, science and technology, and charity as a unit, the obligation to demand and practice knowledge, the responsibility of scientists and artists; inter-religious harmony: religion is God's grace for all, togetherness in religious plurality; Society: civilized and prosperous society, the role of religious communities in realizing a civilized and prosperous society, human rights and democracy; Culture: academic culture, work ethic, open and fair attitude; Politics: the contribution of religious adherents to political life.

**UNP.60.1402 Pancasila Education 2 Credits**

This course contains the meaning of urgency and reasons for the need for Pancasila education in Higher Education; Pancasila in the current history of the Indonesian nation; Pancasila as a philosophical system, as the basis of the state
The Republic of Indonesia, as the state ideology, as an ethical system, and Pancasila as the basis for the value of developing science; Thinking and implementing Pancasila in dealing with current actual problems, such as human rights, racial and economic problems, and the problem of radicalism that must be solved in accordance with the values of Pancasila.

UNP1.60.1403 Citizenship Education 2 Credits
This course contains the nature of civic education in developing full undergraduate or professional abilities; the essence and urgency of national identity as one of the determinants of nation building and character, the urgency of national integrity and national unity; the constitutional values and norms of the 1945 Constitution of the Republic of Indonesia and the constitutional provisions of the legislation under the Constitution; harmony of obligations and rights of the state and citizens in a democracy that is based on people's sovereignty and deliberation for consensus; the nature, instrumentation, and practice of Indonesian democracy based on Pancasila and the 1945 Constitution of the Republic of Indonesia; the historical dynamics of constitutional, socio-political, cultural, and contemporary contexts of sovereign law enforcement; the historical dynamics and the urgency of the insight into the archipelago as a collective conception and view of the Indonesian nationality in the context of world relations; national urgency and challenges and defend the country for Indonesia in building a collective commitment to nationality.

UNP1.60.1404 Indonesian 2 Credits
This course contains the Conception of Indonesian Language, History of Indonesian Language, Position and Functions of Indonesian Language, Indonesian Language Variety, Indonesian Spelling, punctuation letters, words and absorption elements: Effective Sentences, Definition of Characteristics, Terms of Effective Sentences: Paragraphs Types, Functions and Developments: Writing Outline Theme, Topic, Title and Type of Outline: Writing Text (Scientific Academic Texts and Non-Academic Texts: BI Official Letters (Format and Types of Indonesian Official Letters.

UNP1.60.1405 English 2 Credits
This course contains the development of English language skills in an integrated manner by taking into account the needs of students according to their fields/ majors, including understanding basic sentence patterns that help students understand various English references and equip students with communication skills in English according to their field of expertise.

UNP1.61.1201 Fundamentals of Education 2 Credits
Provide insight into human nature, the nature and importance of education, the foundations and principles of education, thoughts about education

UNP1.61.2101 Educational Psychology 2 Credits
This course examinesdiscusses the basic concepts of educational psychology, growth, student development, intelligence, talent, creativity, motivation, memory, individual differences and learning theories.

UNP1.61.2102 Administration and Education Supervision 2 Credits
Educational Administration and Supervision courses are courses that provide insight, basic concepts and processes as well as the scope of Educational Administration and Supervision and apply them in professional school management.

UNP1.60.3101 Entrepreneurship 3 Credits
This course contains knowledge, attitudes and skills based on creative and innovative thinking regarding the basic principles of entrepreneurship, entrepreneurial development models, entrepreneurial strategies, business ethics in entrepreneurship, opportunity analysis, business feasibility studies and business management (marketing, production, finance). , resources, business legality, technology and information.)

UNP1.61.4201 Guidance and Counseling 2 Credits
Guidance and Counseling is a compulsory university education course that provides insight and understanding of the basic concepts of BK, including; understanding, background, objectives, functions, principles, principles and code of conduct of BK, BK development fields, types of BK services, and BK protection activities as well as BK implementation operations in curriculum implementation 2013. In addition, it also discusses the role of the Principal, Deputy Principal, Subject Teachers, Class homeroom teachers, BK teachers or counselors and other personnel as well as BK Supervisors in BK services in schools.

UNP2.60.1401 Basic Natural Sciences 2 Credits S
This course contains the nature and scope of the human mind and its development, the development of science, the earth and the universe the diversity of living things and their distribution, living things in natural ecosystems, natural resources and the environment, the benefits and impacts of science and technology on social life, the history of human civilization and technological developments, some important technological developments, and issues
UNP2.60.1402 Basic Socio-Cultural Sciences 2 Credits
This course contains: Basic concepts in social and cultural sciences to study Indonesian society and changes in Indonesian society and culture. The subjects are humans and human culture as individuals and human social beings, moral values and human law, human diversity and equality, science technology and human arts and the environment.

UNP2.60.2101 Physical Fitness Education 2 Credits
This course applies the effects and benefits of various movement activities for physical fitness and health through various games, competitions, and sports exercises and abilities. Analyze the importance of physical activity to maintain and develop physiological functions of the body and health and can be tolerated throughout life.

UNP2.60.2102 Japanese 2 Credits
Japanese language courses equip students with knowledge about Japanese language practice so that students have the ability to read and communicate using Japanese.

UNP2.60.2103 Multicultural Education 2 Credits
This multicultural education course contains the concept of multicultural education: the urgency of multicultural education in a diverse Indonesian society, building an inclusive diversity paradigm through educational institutions, prospects and constraints of multicultural implementation, implementation of multicultural education in Indonesia, as well as character building of students through the application of multicultural ideology in the field of education.

UNP2.60.2401 History of the Struggle of the Indonesian Nation 2 Credits
The History of the Nation's Struggle course discusses the meaning and historical meaning of the nation's struggle, imperialism and colonialism, the struggle of the Indonesian nation against imperialism and colonialism, the Indonesian national movement, the struggle for independence, the meaning of the proclamation of efforts to maintain independence against various threats that threaten the unitary state of the Republic of Indonesia, the Republic of Indonesia.

FMA1.60.1302 Calculus 4 Credits
This course discusses the real number system, equations and inequalities, absolute values and absolute inequalities, coordinate systems and simple graphs, functions, limits and continuity, derivatives, related rates, graphs, and integrals.

FMA1.60.1303 General Physics 4 Credit Points
This course discusses quantities and units, particle kinematics, particle dynamics, work and energy, linear momentum, angular momentum and rigid bodies, static fluids, dynamic fluids, concepts of temperature and heat, and the laws of thermodynamics.

FMA1.60.2102 General Biology 4 Credit Points
This course discusses the knowledge of living things and scientific methods, cells as the basis of life, metabolism, structure and organization of plant and animal bodies, biodiversity, structure, functions and processes in human organ systems, ecology, genetics and evolution and biotechnology.

FMA1.60.2103 General Chemistry 4 Credit Points
This course discusses Stoichiometry, Chemical Energetics, Atomic Structure, Periodic System of Elements, Chemical Bonds and Molecular Geometry, Forms of Matter and Chemical Equilibrium.

MAT1.61.1301 Introduction to Basic Mathematics 3 Credits
Sets and their operations, Cartesian number sets and multiplication, types and inverse functions, types of relations and inverse relations, set algebra, duality, indexed sets and partitions, cardinal numbers and their operations, finite sets, infinite sets, countable sets, and uncounted sets, proportion, proportion function, argument, tautology, quantified proposition function, proof of the validity and invalidity of quantified argument, determining the truth value of composite propositions with arithmetic, Boolean polynomials in electric current networks

MAT1.61.1302 Basic Algebra and Trigonometry 3 Credits
Comparison of trigonometry, basic trigonometric formulas, periodicity, formulas for the sum and difference of Sine and Cosine and double angles, Addition and Multiplication of Sine and Cosine, Theorem of Sine and Cosine and area of triangles, Trigonometric equations and inequalities, Graphs of trigonometric functions and cyclometric functions.

**MAT1.61.1101 Computer Applications 2 Credits**

This course will start by getting to know computer devices, both software and hardware. Followed by studying Microsoft Office software (word, excel and power point) as well as supporting software in the field of mathematics such as minitab, SPSS and so on.

**MAT1.61.2301 Advanced Calculus 4 Credits**

Real number systems, inequalities and absolute values, functions and limits, infinite series and series, alternating series, absolute convergence, conditional convergence, power series and their operations, Taylor series, Maclaurin series, coordinate system, surfaces in three dimensional space, functions two or more variables, the limit of a two-variable function, continuity, partial derivatives, differentiability, double and triple integrals, drawing graphs.

**MAT1.61.2302 Geometry of Fields and Spaces 3 Credit Points**

Plane geometry includes parallel lines and planes, congruent and congruent triangles, circles, drawings and locus, and areas of plane figures. The geometry of space includes the area and volume of the shape of the space. Furthermore, it also discusses painting in space, the point of intersection of lines and planes, angles, and distances in space.

**MAT1.61.2101 English for Mathematics 2 Credits**

Take an inventory of vocabulary and terms in the fields of Arithmetic, Algebra, Trigonometry, Geometry, Statistics, etc., understand the meaning and use it in English orally and in writing, understand English mathematical texts, and write mathematical statements in the form of definitions, theorems, and proof in English.

**MAT1.61.3301 Analytical Geometry of Planes and Spaces 4 Credit Points**

Position line by line, line by plane, plane by plane. The properties of a conic section (line, circle, parabola, ellipse, hyperbola). Position line by line, line by plane, plane by plane, plane by sphere. The properties of simple surfaces and conical tubes.

spheres, ellipsoids, parabolas and hyperbolas

**MAT1.61.3302 Elementary Statistics 4 Credits**

Role of statistics, Types of data, Population and sample, Parameters and statistics, Data collection, Data presentation, Descriptive and Inferential Statistics, Concentration measure, Dispersion measure, Location measure, Parameter estimation, Confidence interval, Hypothesis test, Simple linear regression, Software use statistics.

**MAT1.61.3303 Psychology of Mathematics Learning 2 Credits**

Understanding, theories, principles and factors that influence the act of learning as well as several schools of mathematics learning theory.

**MAT1.61.3304 Elementary Linear Algebra 4 Credits**

Course competence can be achieved by mastering the material matrix: matrices and their orders, basic operations of matrices, and inverses of matrices; System of Linear Equations: Gaussian Elimination, Elementary Matrix and Inverse Search Methods, SPL and Invertibility and Homogeneous SPL; Determinants: Determinant Functions, Row Reduction, Minor and Cofactor Matrices, and Cramer's Rule; Vector Space: Vectors in R2 and R3, n-Euclides Spaces, Real Vector Spaces, Subspaces, Linear Combinations and Freedoms, Bases and Dimensions, Rank Matrix; Inner Product Space: Inner Product Spaces and measures (Length, Distance, and Angle), Orthonormality; Eigen Space: Eigenvectors and Vectors, EigenSpace Bases, Diagonalization; Linear Transformation: Definition of Linear Transformation (TL), Kernel and Range, TL from Rn to Rm, TL Matrix

**MAT1.61.3305 Number Theory 3 Credit Points**

Natural, whole, integer, rational, irrational, real and complex number systems. Mathematical Induction, Divisible and Binomial coefficients, Congruence, Diophantus linear equations, basic properties of congruence, linear congruence, congruence systems and Chinese Remaining Theorems, Multiplicative Functions: tau and sigma functions, Euler functions, and Ceiling and Floor functions, Primitive Functions: order of integers, primitive roots, arithmetic indices, and primality tests, Quadratic congruence: quadratic congruence law of quadratic reciprocity, Diophantus nonlinear equations: Pythagorean triples, Fermats Last Theorems and Sums of Squares.

**MAT1.61.4301 Mathematics Learning Strategy 3 Credits**

This course aims to equip students with knowledge
about teaching techniques, teaching strategies, teaching methods, teaching approaches, and contemporary mathematics learning models. Form the attitudes and behaviors that students need in their work according to the level of expertise based on the knowledge and skills they master. Based on this understanding, this course is directed to shape students' pedagogical abilities as prospective mathematics teachers.

Lecture activities begin with a brief orientation on the duties and responsibilities of the teacher, the competencies needed by the teacher, and the problems encountered in learning mathematics, as well as the teacher's role in carrying out active, interactive and fun mathematics learning. In this orientation, students get an idea of the importance of teachers mastering and being skilled at using various methods, approaches, and selected learning models.

**MAT1.61.4302 Structure Algebra 4 Credits**
Binary operations; Groups and their properties; Sub groups and their properties; Cyclic group; Symmetry group; K set; Normal subgroup; factor group; Homomorphism and Group Isomorphism; Rings and their properties; ring isomorphism; Sub rings; Ideal; Integral domains; Fields; and Ring Polynomials.

**MAT1.61.4303 Vector Calculus 4 Credits**
Vectors in planes, vector-valued functions, vectors in three-dimensional space, surfaces in three-dimensional space, functions with two or more variables, partial derivatives, limits and continuity, directed and gradient derivatives, chain rules, Lagrange method, fold integrals, vector fields, line integrals, Green's theorem on planes, surface integrals, Gaussian divergence theorem, Stokes' theorem, introduction to differential equations.

**MAT1.61.4304 Algorithm and programming 3 Credits**
Algorithm (how to compose and analyze an algorithm), the basics of computer programming, the Pascal programming language in which it will study variables and data types, input and output, condition selection, loops, arrays, procedures and functions.

**MAT1.61.4305 Study of School Mathematics Curriculum 3 Credits**
Analyzing the material, sequence and depth of the mathematics curriculum material at the basic education level, as well as the learning process (learning experience, methods, and evaluation).

**MAT1.61.5301 Mathematics Learning Design 3 Credits**
Skilled in designing and developing learning tools (syllabus, lesson plans, teaching materials, media and assessment instruments) and using them for the benefit of learning mathematics. In addition, he is skilled in developing mathematical abilities, high-level mathematical thinking, and a positive attitude towards mathematics through designed learning tools.

**MAT1.61.5302 Evaluation of Mathematics Learning 3 Credits**
This course discusses the nature of learning evaluation, development of tests and non-tests, indicators used to measure the quality of assessment tools, and processing measurement results, as well as their application in the field of mathematics studies. After studying this course, students are expected to master various concepts of procedures and techniques for assessing the learning process and learning outcomes of mathematics. For this reason, students are required to make examples of evaluating the process and results of learning mathematics. Students' abilities will be measured by tests.

**MAT1.61.5201 Mathematics learning media 3 credits**
Familiarize yourself with various media and teaching aids for high school mathematics and exercises on their creation, use and maintenance.

**MAT1.61.5303 Mathematics Statistics 3 Credits**
Theories of combinatoric analysis: counting techniques, permutations and combinations, probability: definition of probability, laws of probability, conditional probability, independent events and Bayes' theorem. Random variables and their distributions: probability functions of discrete and continuous random variables, joint probability functions, marginal and conditional probability functions. Mathematical expectations, expected values of random variables and their properties, Chebyshev's theorem and moment generating functions. Some of the probability distributions of special random variables: discrete uniform distribution, Bernoulli distribution, Binomial, Hypergeometric, Multinomial, negative binomial, and Geometric distribution, continuous uniform distribution, normal, gamma, exponential, and chi-square distribution.

**MAT1.61.5101 Ordinary Differential Equations 3 Credits**
Types and orders of PD. Initial value problems and boundary value problems, First-order GDP, First-order GDP solution methods, Picard method, high-order GDP, High-order GDP solving methods, Solving real phenomena problems that can be modeled with GDP, PD solving with series rank.
Frobenius Method, Bessel Function, Legendre Polynomial, PD System, PD Solving with Laplace Transform, GDP Numerical Solution

**MAT1.61.5304 Discrete Mathematics 3 Credits**

Logical functions, Bole’s Algebra, Pigeon’s Nest Principle, Exclusion-Inclusion Principle, Generating Functions and Graph theory.

**MAT1.61.6201 Micro Teaching 3 Credits**

This course aims to form the attitudes and behaviors required by students in their work according to their level of expertise based on the knowledge and skills they have mastered. Based on this understanding, this course is directed to form students’ professional abilities as professional teachers/educators.

The learning program starts from planning learning activities, implementing learning, and then conducting evaluations. This course examines the steps in implementing a learning program. Therefore, in this course, students are trained to have the basic skills needed to carry out classroom learning. Basic teaching skills training in the form of micro (Peer Teaching) includes basic questioning skills, reinforcement skills, variation skills, explaining skills, opening and closing lessons, classroom management skills, group discussion leadership skills, and small group teaching skills.

As a skill-building course (skills), this course is directed to provide real experience for students to play themselves as teachers/educators in the classroom in the form of micro-learning exercises. Various basic skills that must be mastered by students are trained in this course. The more tangible benefit is preparing students before participating in the actual teaching practice in the classroom.

**MAT1.61.6202 Research Methods for Mathematics Education and Teaching 3 Credits**

Definition of research, reasons for the need for research, research objectives, research functions, sources of knowledge (approach in obtaining the truth), scientific and non-scientific methods. Types of Research: descriptive, historical, correlational, causal comparative, experimental, and developmental research. Problem: problem identification, problem selection, problem formulation, problem background. Literature review: reading sources, criteria for choosing reading sources, organizing the substance of theoretical studies. Hypothesis: understanding the hypothesis, various hypotheses. Variables: understanding and types of variables. Research Instruments: types, types of data collection tools, selection of data collection tools, quality of data collection tools (validity, reliability, objectivity). Definition of population and sample, criteria for representative samples, and sampling techniques. Data analysis techniques: scoring, tabulation, data description, statistical test (inference), and interpretation of data analysis results. Conclusions, implications and research suggestions: conclusions (how to make decisions), implications, and suggestions. Research proposal writing.

**MAT1.61.6301 Introduction to Operations Research 3 Credits**

This course is designed to introduce the use of mathematics in solving optimization problems that can be formulated into linear functions. Emphasis is given to problem formulation, mastery of solving techniques and the meaning of geometry. Topics that will be discussed include: linear programming, simplex method, duality, and sensitivity analysis.

**MAT1.61.6011 Real Analysis I 3 Credits**


**MAT1.61.7101 Thesis Seminar 2 Credits**

Prepare proposals in accordance with issues approved by the supervisor, present and defend the draft proposal in front of the board of examiners.

**MAT1.61.7301 Thesis 4 Credits**

Designing Instruments, Conducting Research, Writing Research Reports, Defending Research Reports in front of the Examiner board.

**MAT1.61.7102 Sampling Technique 3 Credits**

Some concepts of statistical theory and research design, simple random sampling, proportion and percentage sampling of sample size estimates, layered random sampling, systematic sampling.
MAT2.61.8101 Transformation Geometry 3 Credits
This course equips students to understand the concepts and principles of transformation on a flat plane. The material includes: Definition of Transformation, Isometry, Composition Reflection, and some isometry, among others half-turn, congruence, and dilation shift, spin, reflection sliding, transformations.

MAT2.61.6102 History of Mathematics 2 Credits
History of Mathematics by Age: Ancient Egypt, Mesopotamia, Ancient Greece, Alexandria, Late Greek Period, China, India, Arab Empire, Europe to XIV Century, XV Century to XX Century. History of Mathematics Based on the Discovery of Matter. History of Mathematics Based on Inventors

MAT2.61.6103 Actuarial 3 Credits
This lecture begins with material that discusses the actuarial world, interest rates, definite annuities, amortization schedules and sinking funds, concepts of opportunity theory, mortality tables, life annuities, pure endowments, life insurance and the concept of net premium reserves.

MAT2.61.6104 Numerical Method 3 Credits
Error definition, definition, source and examples of error, an error propagation and its arrosiation. Finding the roots of nonlinear equations using the halves method, false position, Newton's and Secant's methods. Polynomial interpolation using Newton's divided difference, Newton's forward and backward interpolation, Lagrange interpolation.

MAT2.61.8301 Applied Regression Analysis 3 Credits
Simple Linear Regression, Multiple Linear Regression, Model Fit, Residual Analysis, Transformation for Unsuitable Regression Model, Best Model Selection, Multi collinearity.

MAT2.61.8102 Advanced Computer Applications 3 Credits
This course will begin with getting to know software to create mathematics learning media. Followed by studying learning media maker software (macro media flash) as well as supporting software in the field of mathematics.

MAT2.61.8103 Introduction to Topology 3 Credits
Topological Spaces, Bases and subbases, Continuity, Metric Spaces, Contability, Separation axioms, Compactness, Connectivity, and Complete Metric Spaces.

MAT2.61.8104 Multivariate Analysis 3 Credits

MAT2.61.8105 Group Theory Up to 3 Credits
Definition of finite groups, examples of various types of finite groups, definitions of permutations, symmetry groups, and permutation classes, definitions of alternating groups, understanding of basic properties related to special finite groups (symmetry, alternating), understanding of normalizers, centralizers, commutators, and center, Jordan Holder decomposition theorem, understanding group action on sets, understanding Sylow's group and Sylow's theorem.

MAT2.61.8106 Mathematical Statistics 2 3 Credits

MAT2.61.8201 Mathematical Modeling 3 Credits
Understanding mathematical models and models, The process of modeling real problems, Types of mathematical models and problems, Stages of forming mathematical models, Models based on the rate of change, Static and dynamic models, Deterministic and stochastic models, Optimization models, Mathematical models in scientific planning, and application analysis.

2018 FMIPA Academic Manual
various disciplines.

**MAT2.61.8106 Database 3 Credits**
This course begins with an introduction to databases followed by database architecture, database design, Entity relationship diagrams (ERD), normalization, Structural Query Language (SQL), using application software to create databases such as Microsoft Visual basic, PHP, MySQL and etc.

**MAT2.61.8202 Real Analysis 2 3 Credits**
**Limits:** Function Limits, Sequence Criteria for Limits, Divergence Criteria, Limit Theorems, Extension of the concept of limits. **Continuous Function:** Continuous Functions, Discontinuous Criteria, Interval Continuity, Uniform Continuous, Monotonous Functions, and Inverse Functions. **Derivative:** Derivatives, Mean Value Theorem Average, L'Hospital's Rule, Taylor's Theorem. **Integral:** Riemann integral, Fundamental Theorems of Calculus, Integral Approximation.

---

**Study Program : Mathematics (S1)**

1) **Vision**
   Become a nationally reputable study program in mathematics in 2020 based on faith and piety.

2) **Mission**
   The mission of the Mathematics Study Program is as follows:
   1. Organizing quality education based on faith and piety.
   2. Carry out research of national reputation in the field of mathematics and its applications.
   3. Carry out quality community service in the field of mathematics and its applications.
   4. Develop cooperation with various government agencies, private and stakeholders.

3) **Purpose**
   The Objectives of the Mathematics Study Program, FMIPA UNP generally are: To produce a Bachelor of Mathematics who has a competitive and comparative advantage according to national quality standards. The Objectives of the Mathematics Study Program, FMIPA UNP in particular is:
   1. Produce Mathematics Bachelors who have mathematical competence and development and have soft skills, good emotional and spiritual intelligence.
   2. Produce quality standards of content, process and assessment of lectures.
   3. Provide maximum educational facilities and infrastructure.
   4. Produce research in the field of mathematics and its applications that are increasingly of high quality.
   5. Utilizing the results of research in the field of mathematics and applied for science and technology enrichment, quality improvement, fulfillment of knowledge-based community needs.
   6. Publish research results in the field of mathematics and applied through seminars, journals, and books at national and international levels.
   7. Carry out quality community service to solve problems faced by the community in the field of mathematics and its applications.
   8. Increase cooperation at local and regional levels with Universities and Local Governments.
9. Increasing national level cooperation with the Ministry of National Institution Government Non Ministry and organization/society p

4) Graduate Competencies
Competencies of graduates of the Mathematics Study Program of FMIPA UNP dirde define as follows:

1. Field of Work Ability
a. Able to develop mathematical thinking, starting from procedural / computational understanding to a broad understanding including exploration, logical reasoning, generalization, abstraction, and formal proof (CP-KK 1).

b. Able to observe, recognize, formulate and solve problems through a mathematical approach with or without the help of software (CP-KK 2).

c. Able to reconstruct, modify, analyze / think in a structured way to the mathematical problems of an system/problem, assessing accuracy and inter-achieve it (CP-KK 3).

d. Able to take advantage of various alternatives solving mathematical problems that have been readily available independent or groups to make the right decisions (CPKK4).

e. Able to adapt or develop themselves, both in mathematics and other relevant fields (including fields in the world of work).

2. Knowledge Mastery Ability
a. Mastering mathematical theoretical concepts including mathematical logic, discrete mathematics, algebra, analysis and geometry, and probability theory and statistics (CP-PP 1).

b. Mastering the principles of mathematical modeling, online programer, differential equations, and numerical methods (CP-PP 2).

3. Managerial Ability:
 a. Able to communicate and cooperate with community members.

b. Able to negotiate with applied field practitioners.

4. Attitudes and Values:
 a. Understanding the values of character, science, and the life of the nation and state.

b. Able to carry out work honestly, disciplined, and responsible.

c. Able to act ethically and morally.

2018 FMIPA Academic Manual
<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>MAT1.62.1002</td>
<td>Computer application</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>MAT1.62.1003</td>
<td>English For Mathematics</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>MAT1.62.202</td>
<td>Advanced Calculus</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>MAT1.62.2003</td>
<td>Basic Introduction Mathematics</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>MAT1.62.3001</td>
<td>Elementary Linear Algebra</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>MAT1.62.3002</td>
<td>Elementary Statistics</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>MAT1.62.3004</td>
<td>Vector Calculus</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>MAT1.62.3005</td>
<td>Discrete mathematics</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>MAT1.62.4001</td>
<td>Differential Equation</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>MAT1.62.4002</td>
<td>Algebraic Structure</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>MAT1.62.4003</td>
<td>Chance Theory</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>13</td>
<td>MAT1.62.4004</td>
<td>Actuarial</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>14</td>
<td>MAT1.62.4005</td>
<td>Algorithm and Programming</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>MAT1.62.4006</td>
<td>Transformation Geometry</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>16</td>
<td>MAT1.62.5001</td>
<td>Numerical Method</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>17</td>
<td>MAT1.62.5002</td>
<td>Real Analysis 1</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>18</td>
<td>MAT1.62.5003</td>
<td>Mathematical Statistics</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>19</td>
<td>MAT1.62.5004</td>
<td>Operations Research</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>20</td>
<td>MAT1.62.6001</td>
<td>Real Analysis 2</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>21</td>
<td>MAT1.62.6002</td>
<td>Mathematical Modeling</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>22</td>
<td>MAT1.62.6003</td>
<td>Research methods</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>23</td>
<td>MAT1.62.7001</td>
<td>Complex Analysis</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>24</td>
<td>MAT1.62.7002</td>
<td>Thesis Seminar</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

**B. Study Program Compulsory Courses Program**

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MAT1.62.8001</td>
<td>Thesis</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>

**Total SKS:** 79

**Number of Credits:** 72

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MAT2.62.7001</td>
<td>Introduction to Topology</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>MAT2.62.7002</td>
<td>Introduction to Analysis Functional</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>MAT2.62.7012</td>
<td>Numerical Analysis</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>MAT2.62.7001</td>
<td>Introduction to Size Theory</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>MAT2.62.8002</td>
<td>Calculus of Variations</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>MAT2.62.8002</td>
<td>Calculus of Variations</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total Number of Credits:** 18

**C. Choice of Algebra Expertise Group (CHOOSE MINIMUM 3 OF 15 SKS)**

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MAT2.62.5002</td>
<td>History of Mathematics</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>MAT2.62.6003</td>
<td>Number Theory</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>MAT2.62.6004</td>
<td>Linear Algebra</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>MAT2.62.7003</td>
<td>Module Theory</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>MAT2.62.8003</td>
<td>Finite Group Theory</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total Number of Credits:** 15

**D. Choice of Financial and Actuarial Mathematics Expertise Group (PILIHMINIMAL3 OF 15 CREDITS)**

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MAT2.62.5006</td>
<td>Advanced Actuarial</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>MAT2.62.6005</td>
<td>Investment Management</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>MAT2.62.7008</td>
<td>Company Operations</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>MAT2.62.7009</td>
<td>Statistical Method</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

2018 FMIPA Academic Manual
religion in realizing a civilized and prosperous society, human rights and democracy; Culture: academic culture, work ethic, open and fair attitude; Politics: the contribution of religious adherents in political life, the role of religious adherents in realizing national unity and integrity.

**UNP1.60.1402 Pancasila Education 2 Credits**
This course contains the meaning of urgency and reasons for the need for Pancasila education in Higher Education; Pancasila in the current history of the Indonesian nation; Pancasila as a philosophical system, as the basis of the state of the Republic of Indonesia, as a state ideology, as an ethical system, and Pancasila as the basis for the value of developing science; Thinking and implementing Pancasila in dealing with current actual problems, such as human rights, racial and economic problems, and the problem of radicalism that must be solved in accordance with the values of Pancasila.

**UNP1.60.1403 Citizenship Education 2 Credits**
This course contains the nature of civic education in developing full undergraduate or professional abilities; the essence and urgency of national identity as one of the determinants of nation building and character; the urgency of national integrity and national unity; the constitutional values and norms of the 1945 Constitution of the Republic of Indonesia and the constitutional provisions of the legislation under the Constitution; harmony of obligations and rights of the state and citizens in a democracy that is based on people's sovereignty and deliberation for consensus; the nature, instrumentation, and practice of Indonesian democracy based on Pancasila and the 1945 Constitution of the Republic of Indonesia; the historical dynamics of constitutional, socio-political, cultural, and contemporary contexts of sovereign law enforcement; the historical dynamics and the urgency of the insight into the archipelago as a collective conception and view of the Indonesian nationality in the context of world relations; national urgency and challenges and defend the country for Indonesia in building a collective commitment to nationality.

**UNP1.60.1401 Religious Education 3 Credits**
The One and Only Godhead: faith and piety, divine philosophy (Theology); Humans: human nature, human dignity, human responsibility; Law: raise awareness to obey God's law, prophetic function of religion in law; Moral: religion as a source of morals, morals in life; Science, Technology and Arts: Faith, science and technology, and charity as a unit, the obligation to demand and practice knowledge, the responsibility of scientists and artists; inter-religious harmony: religion is God's grace for all, togetherness in religious plurality; Society: civilized and prosperous society, the role of the people

**Synopsis**

**UNP1.60.1401 Religious Education 3 Credits**
The One and Only Godhead: faith and piety, divine philosophy (Theology); Humans: human nature, human dignity, human responsibility; Law: raise awareness to obey God's law, prophetic function of religion in law; Moral: religion as a source of morals, morals in life; Science, Technology and Arts: Faith, science and technology, and charity as a unit, the obligation to demand and practice knowledge, the responsibility of scientists and artists; inter-religious harmony: religion is God's grace for all, togetherness in religious plurality; Society: civilized and prosperous society, the role of the people
UNP1.60.1405 English 2 Credits
This course contains the development of English language skills in an integrated manner by taking into account the needs of students according to their fields/ majors, including understanding basic sentence patterns that help students understand various English references and equip students with communication skills in English according to their field of expertise.

UNP1.60.3101 Entrepreneurship 3 Credits
This course contains knowledge, attitudes and skills based on creative and innovative thinking regarding the basic principles of entrepreneurship, entrepreneurial development models, entrepreneurial strategies, business ethics in entrepreneurship, opportunity analysis, business feasibility studies and business management (marketing, production, finance), resources, business legality, technology and information.

UNP2.60.1401 Basic Natural Sciences 2 Credits
This course contains the nature and scope of the human mind and its development, the development of science, the earth and the universe, the diversity of living things and their distribution, living things in natural ecosystems, natural resources and the environment, the benefits and impacts of science and technology on social life, the history of human civilization and technological developments, some important technological developments, and environmental issues.

UNP2.60.1402 Basic Socio-Cultural Sciences 2 Credits
This course contains: Basic concepts in social and cultural sciences to study Indonesian society and changes in Indonesian society and culture. The subjects are humans and human culture as individuals and human social beings, moral values and human law, human diversity and equality, science technology and human arts and the environment.

UNP2.60.2101 Physical Fitness Education 2 Credits
This course applies the effects and benefits of various movement activities for physical fitness and health by various games, competitions, and sports exercises and abilities. analyze the importance of physical activity to maintain and develop physiological functions of the body and health and can be throughout life.

UNP2.60.2102 Japanese 2 Credits
Japanese language courses equip students with knowledge about Japanese language practice so that students have the ability to read and communicate using Japanese.

UNP2.60.2103 Multicultural Education 2 Credits
This multicultural education course contains the concept of multicultural education: the urgency of multicultural education in a diverse Indonesian society, building an inclusive diversity paradigm through educational institutions. prospects and constraints of multicultural implementation, implementation of multicultural education in Indonesia, as well as character building of students through the application of multicultural ideology in the field of education.

UNP2.60.2401 History of the Struggle of the Indonesian Nation 2 Credits
The History of the Nation’s Struggle course discusses the meaning and historical meaning of the nation’s struggle, imperialist and colonialism, the struggle of the Indonesian nation against imperialism and colonialism, the Indonesian national movement, the struggle for independence, the meaning of the proclamation of efforts to maintain independence against various threats that threaten the unitary state of the Republic of Indonesia, the Republic of Indonesia.

FMA1.60.1302 Calculus 4 Credits
This course discusses the real number system, equations and inequalities, absolute values and absolute inequalities, coordinate systems and simple graphs, functions, limits and continuity, derivatives, related rates, graphs, and integrals.

FMA1.60.1303 General Physics 4 Credit Points
This course discusses quantities and units, particle kinematics, particle dynamics, work and energy, linear momentum, angular momentum and rigid bodies, static fluids, dynamic fluids, concepts of temperature and heat, and the laws of thermodynamics.

FMA1.60.2102 General Biology 4 Credit Points
This course discusses the knowledge of living things and scientific methods, cells as the basis of life, metabolism, structure and organization of the body.
plants and animals, biodiversity, structure, function and processes in human organ systems, ecology, genetics and evolution and biotechnology.

**FM1.60.2103 General Chemistry 4 Credit Points**
This course discusses Stoichiometry, Chemical Energies, Atomic Structure, Periodic System of Elements, Chemical Bonds and Molecular Geometry, Forms of Matter and Chemical Equilibrium.

**MAT1.62.1001 Analytical Geometry 3 Credits**
Coordinate system (in plane and in space), distance between two points in plane and in space, equation of line in plane, circle, parabola, ellipse, hyperbola, plane, line in space and sphere

**MAT1.62.1002 Computer Applications 2 Credits**
Familiarize yourself with computer equipment, both software and hardware. Followed by studying Microsoft Office software (word, excel and power point) as well as supporting software in the field of mathematics such as Minitab, SPSS and so on.

**MAT1.62.1003 English for Mathematics 2 Credits**
Inventory of vocabulary and terms in the fields of Arithmetic, Algebra, Trigonometry, Geometry, Statistics, and others. Understand the meaning and use it in English both orally and in writing, understand English mathematical texts, and write mathematical statements in the form of definitions, theorems, and proofs in English

**MAT1.62.2002 Advanced Calculus 4 Credits**
Real number systems, inequalities and absolute values, functions and limits, infinite series and series, alternating series, absolute convergence, conditional convergence, power series and their operations, Taylor series, Maclaurin series, coordinate system, surfaces in three dimensional space, functions two or more variables, the limit of a function of two variables, continuity, partial derivatives, differentiability, double and triple integrals, drawing graphs.

**MAT1.62.2003 Introduction to Basic Mathematics 3 Credits**
Set Theory: Sets and Operations, Sets of Numbers and Cartesian Multiplication, Types and Inverses of Functions, Relations, Algebra Set, Duality, Indexed Set, Numbered Set, Mathematical Logic: Propositions, Propositional Functions, Arguments, Quantities, Tautology, Proof

The Validity of Proposition Functions, and Quantitative Functions Validity Proof.

**MAT1.62.3001 Elementary Linear Algebra 4 Credits**
Matrices: matrices and their orders, basic operations of Matrix, and Inverse of Matrix; System of Linear Equations: Gaussian Elimination, Elementary Matrix and Inverse Search Methods, SPL and Invertible and Homogeneous SPL; Determinants: Determinant Functions, Row Reduction, Minor and Cofactor Matrices, and Cramer’s Rule; Vector Spaces: Vectors in R2 and R3, n-Euclides Spaces, Real Vector Spaces, Subspaces, Linear Combinations and Freedoms, Bases and Dimensions, Rank Matrix; Inner Product Spaces: Inner Product Spaces and measures (Length, Distance, and Angle), Orthonormality; Eigen Space: Eigen Values and Vectors, Base Eigen Space, Diagonalization; Linear Transformation: Definition of Linear Transformation (TL), Kernel and Range, TL from Rn to Rm, TL Matrix.

**MAT1.62.3002 Elementary Statistics 4 Credits**
Role of statistics, Types of data, Population and sample, Parameters and statistics, Data collection, Data presentation, Descriptive and Inferential Statistics, Concentration measure, Dispersion measure, Location measure, Parameter estimation, Confidence interval, Hypothesis test, Simple linear regression, Usage statistics software

**MAT1.62.3004 Vector Calculus 4 Credits**
Vectors in planes, vector-valued functions, vectors in three-dimensional space, surfaces in three-dimensional space, functions with two or more variables, partial derivatives, limits and continuity, directed and gradient derivatives, chain rules, Lagrange method, fold integrals, vector fields, line integrals, Green’s theorem on planes, surface integrals, Gaussian divergence theorem, Stokes’ theorem, introduction to differential equations.

**MAT1.62.3005 Discrete Mathematics 3 Credits**
Logical Functions, Boolean Algebra, Pigeon Nest Principle, Inclusion Exclusion Principle, Generating Functions, and Graph Theory.

**MAT1.62.4001 Ordinary Differential Equations 4 Credits**
Types and orders of PD, Initial value problems and boundary value problems, First-order GDP, First-order GDP settlement methods, Picard method, high-order GDP, High-order GDP solving methods, Solving real phenomena problems that can be modeled with GDP, PD solving with power series, Frobenius method, Bessel function, Legendre polynomial, PD system,

MAT1.62.5003 Mathematical Statistics 4 Credits
special probability distribution(uniform distribution, binomial, Poisson, normal, geometric, negative binomial, hypergeometric, multinomial, multiple hypergeometric, gamma, exponential, chi-square, beta, multiple normal), random variable transformation, sampling distribution (mean distribution, chi-square, tstudent, F, statistical means), parameter estimation theory (unbiased estimator, principle-compliant efficient, sufficient, moment method, maximum likelihood method, Bayesian estimator), and hypothesis testing theory

MAT1.62.5004 Operations Research 4 Credits
the use of mathematics in solving optimization problems that can be formulated into non-linear functions. Emphasis is given to problem formulation, mastery of solving techniques and the meaning of geometry. The topics that will be discussed include: one-dimensional minimization methods, unconstrained optimization techniques, and constrained optimization techniques.

MAT1.62.6001 Real Analysis 2 3 Credits

MAT1.62.6002 Mathematical Modeling 4 Credits
Understanding mathematical models and models, The process of modeling real problems, Types of mathematical models and problems, Stages of forming mathematical models, Models based on the rate of change, Static and dynamic models, Deterministic and stochastic models, Optimization models, Mathematical models in various disciplines.

MAT1.62.6003 Research Methods 2 Credits
Definition of research, reasons for the need for research, research objectives, research functions, sources of knowledge (approach in obtaining the truth), scientific and non-scientific methods. Types of Research: descriptive, historical, correlational, causal comparative, experimental, and developmental research. Problems: problem identification, problem selection,

**MAT1.62.7001 Complex Analysis 4 Credits**

**MAT1.62.7002 Thesis Seminar 2 Credits**
writing research proposals and presenting research proposals that will be used as thesis

**MAT1.62.8001 Thesis 4 Credits**
submit and write the results of his research in the form of a thesis as a final project as one of the ways to get a bachelor's degree. students are able to defend the thesis they wrote on a thesis exam in front of the board of examiners. Students are also able to make a research resume that is sourced from a thesis source into a scientific article published in the form of an E-Jurnal.

**MAT2.62.5001 Differential Equation Theory 3 Credit Points**
Existence and singularity theorems, linear PD theory and linear systems, Sturm theory, Sturm Liouville problem, Characteristic and orthogonality functions, Orthonormal functions, Fourier series trigonometry, Phase Spaces, Paths, Critical points, Periodic solutions and cycle limits, Kryloff and Bogoliuboff methods.

**MAT2.62.5002 History of Mathematics 3 Credits**
History of Mathematics by Age: Ancient Egypt, Mesopotamia, Greece

Ancient, Alexandrian, Late Greek Period, China, India, Arab Empire, Europe to XIV Century, XV Century to XX Century. History of Mathematics Based on the Discovery of Matter. History of Mathematics Based on Inventors.

**MAT2.62.5003 Number Theory 3 Credit Points**

**MAT2.62.5004 Introduction to Stochastics 3 Credits**

**MAT2.62.5005 Sampling Techniques 3 Credits**
This course discusses the basics of sampling (basic sampling technique, sampling method, sampling error), probability sampling (simple random sampling, stratified sampling, systematic sampling, cluster sampling) and chance sampling (incidental sampling, convenient sampling), total sampling, snowball sampling, purposive sampling.

**MAT2.62.5006 Advanced Actuarial 3 Credits**
Multiple Decrement (Joint Distribution, Joint Life Status, Last Survivor Status and Dependent Lifetime Model), Multiple Decrement Models (Random Survivorship Group and Associated Single Decrement Tables) and Application of Theory Multiple Decrements.

**MAT2.62.5007 Partial Differential Equations 3 Credits**
General understanding and provisions regarding PDP, formation of PDP, integral PDP, linear PDP level 1 with constant and non-constant coefficients, separate variable solutions, level 2 linear PDP with constant and non-constant coefficients, Initial Value Problems for Heat Equations, Liouville Strum Theory, Dirichlet problem, Initial value problem of Heat equation, Application of PDP in other fields, eg vibration, transmission, conduction.

**MAT2.62.5008 Management 3 Credits**
Concepts, principles, approaches and processes of management in organizations. Concepts, principles, approaches and management processes in the field of work, such as offices, cooperatives and agribusiness.

**MAT2.62.6001 Linear Algebra 3 Credits**
*Matrix and Linear System:* Essential Algebraic Properties and Fields, Matrices and Partitions, Special Matrices, and Matrix Equivalence; *Vector Space:* Vector spaces and their properties, subspaces, linear and base freedom, rank matrices, coordinates and isomorphisms, determinants and linear equations; Matrix Presentation of Homomorphisms; Canonical Form Theory; Calculate; Inner Product Space; Normal Linear Transformation; Quadratic Shape.

**MAT2.62.6002 Regression Analysis 3 Credits**
Simple Linear Regression, Multiple Linear Regression, Model Fit, Residual Analysis, Transformation for Unsuitable Regression Models, Best Model Selection, Multicollinearity

**MAT2.62.6003 Multivariate Analysis 3 Credits**
Normal multivariate distribution, inference about mean vector, and theory of estimation (estimation of mean vector and covariance matrix, confidence interval and hypothesis testing of one and two population vectors) and manova.

**MAT2.62.6004 Non-Parametric Statistics 3 Credits**

**MAT2.62.6005 Investment Management 3 Credits**
Material that discusses the meaning of investment and the investment process. To be able to invest, it must be understood about the theory of profit (return) and risk. Furthermore, it is discussed about capital market instruments including stocks, bonds and derivative instruments. Furthermore, it is discussed in more detail regarding Mutual Funds as one of the investment instruments in the capital market whose popularity is starting to rise. Then it is studied about portfolio theory and how to choose an efficient portfolio from various assets. Theory *Mean Variance Efficient Portfolio*, Markowitz models, *Capital Asset Pricing Model* becomes the next discussion accompanied by its application in investing.

**MAT2.62.6006 Graph Theory 3 Credits**
Basic definitions, Miscellaneous Graphs, Modeling with Graphs, Operations on Graphs, Connected Graphs, Euler Graphs, Hamilton Graphs, Tree and Forest Graphs, Planar and Dual Graphs, Graph Coloring, Digraphs, Matching Graphs, Network Flow.

**MAT2.62.6007 Introduction to System Dynamics 3 Credits**

**MAT2.62.6008 Field Work Practice 3 Credits**
Field work practice is an internship activity for final year students in government or private agencies/companies that have an interest in mathematics and data processing/management. This activity aims to apply the knowledge / skills acquired during college and prepare prospective graduates to enter the world of work.

**MAT2.62.7001 Introduction to Topology 3 Credits**
Definition of topology, topology space, subset of point sets in topological space, sum topology, product topology, bases and subbases, continuous functions, Dense sets, and separable axioms, Count, Axiom of Separation.

**MAT2.62.7002 Introduction to Functional Analysis 3 Credits**
Vector space, normed space, banach space: definition and basic properties, examples of normed space and banach space. Pre Hilbert space: understanding and nature. Definition of norm and distance in pre Hilbert space, Orthogonal and Orthonormal vectors in pre Hilbert space. Hilbert Room:
understanding and basic properties of Transformation of Hilbert spaces to other Hilbert spaces, operators and continuous linear functions on Hilbert spaces, Banach algebra, self adjoint, projection operators.

**MAT2.62.7003 Theory Module 3 Credits**
Definition of module; Submodules; Kuosen Module (Factor Module); Direct Amount; Exact Lines; Homomorphism; Simple Module, Free Module; Projective Module; Free Module on Main Ideal Areas (DIU); FG Module over DIU.

**MAT2.62.7004 Forecasting Techniques 3 Credits**

**MAT2.62.7005 Trial Design 3 Credits**

**MAT2.62.7006 Linear Model 3 Credits**
Linear models in matrix notation (Review of vector and matrix algebra, inverse matrices, general inverse matrices and special inverse matrices, random variable matrices and their properties, model representation in matrix form, use of matrices for analysis of linear models (regression models, models) experimental design, and general model), calculate the estimated value of the full power model parameter, and calculate the estimated value of the non-full power model parameter.

**MAT2.62.7007 Life Test Analysis 3 Credits**

**MAT2.62.7008 Life Insurance Company Operations 3 Credits**
Life insurance company operations; competence, regulation, and ethics in the life insurance industry; formation and structure in life insurance companies; the organizational structure of the insurance company; marketing strategies and activities; and departments in life insurance companies.

**MAT2.62.7009 Actuarial Statistical Methods 3 Credits**
Introduction to regression analysis, simple regression, multiple regression (OLS estimator properties, classical assumption test, inference to parameters), Regression with dummy variables, Regression with stochastic independent variables, Serial correlation and heteroscedasticity in regression models, Generalized Least Square (GLS) Estimator and its properties, Extrapolation and refinement of time series data, seasonal time series model, Stationary time series model, random-walk model, cointegration model, moving average model, autoregression model, ARMA, ARIMA, ARIMA model estimation, Diagnostic check, Forecasting with ARIMA models, application of models and computational studies using econometric software.

**MAT2.62.7010 Database 3 Credits**
The introduction to the database is followed by database architecture, database design, Entity relationship diagrams (ERD), normalization, Structural Query Language (SQL), using application software to create databases such as Microsoft Visual basic, PHP, MySQL and so on.

**MAT2.62.7011 Mathematics Biology 3 Credits**
Mathematical models, qualitative properties of differential equations, single-species and multi-species population models, discrete and continuous population models, age-structured population models, deterministic population models, growth models, examples of the use of population models in various fields.

**MAT2.62.7012 Numerical Analysis 3 Credits**
Definition of Numerical Analysis, Taylor Series, Convergence, Computer Arithmetic and Error Analysis, Nonlinear Equations, Interpolation, Numerical Integration (Composite Rules and Gaussian Quadrature), Numerical GDP and PDP.

**MAT2.62.8001 Introduction to Size Theory 3 Credits**
Algebra, Sigma-Algebra, Measurable Spaces, Measurable Sets, Measured Functions, Measures, Measuring Spaces, Integrals, Integrated Functions, Monotonous Convergence Theorem, Fatou’s Lemma, Properties of Integrals, Integral Functions, Positivity and Linearity of Integrals, Lebesque Dominance Convergence Theorem, Lebesque space (Lp), Convergence mode, Size decomposition,
**MAT2.62.8002 Variation Calculus 3 Credits**  
Elements of Theory, General Forms of Variation Problems, General Variations of Functionalties, Canonical Forms of Euler’s Equations, Second Variation, Various Applications.

**MAT2.62.8003 Group Theory Up to 3 Credits**  

**MAT2.62.8004 Formation of Mortality Table 3 Credits**  
Survival and multi-state models, parametric and non-parametric methods for survival data analysis and Graduation principles and methods.

**MAT2.62.8005 Game Theory 2 Credits**  
History of Game Theory, Definition, Elements and Rules of the Game, Pure and Mixed Strategy, Information Games, Asymmetric Information.

**MAT2.62.8006 Industrial Psychology 2 Credits**  
Introduction to industrial and organizational psychology, organization, the basics of individual behavior, individual perceptions and decisions, motivation, value attitudes and job satisfaction, job selection and placement, decision making, leadership, communication, team and team work, conflict and negotiation, basics organizational structure and organizational culture, as well as organizational change and work stress.

**MAT2.62.8007 Teaching Mathematics 3 Credits**  

**MAT2.62.8008 Managerial Accounting 3 Credits**  
The basic concepts of management accounting, activity-based accounting, calculation of the cost of products and services, and planning and control, all of which lead to the decision-making process that will be carried out by the decision maker.

---

**Study Program: Statistics (S1)**

1) **Vision**  
To become one of the leading statistical study programs at the national level in the fields of education, government, economy, and the environment based on faith and piety in 2027.

2) **Mission**
   
a. Organizing quality education with a curriculum oriented to the fields of education, government, economics, and the environment to produce a Bachelor of Statistics who is faithful and devoted
   
b. Carry out research, development and application of statistics in the fields of education, government, economics, and the environment, as well as publish at the national and international levels
   
c. Providing services to the community as an effort to apply statistics in the fields of education, government, economy, and the environment
   
d. Collaborating with educational institutions, government agencies, the private sector, and stakeholders

3) **Purpose**
   
1. Forming students who have faith and piety
2. Produce graduates who are knowledgeable, skilled, professional, and able to apply statistics in the fields of education, government, economics, and the environment
3. Produce statistical research for the development and application of statistics in the fields of education, government, economics, and the environment,  
4. Publish research results at national and international levels
5. Generate community service in the field of Statistics which quality
### 4) Curriculum
Mathematics Department
Study Program: Statistics (S1)

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>T</th>
<th>P</th>
<th>L</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>STAT001</td>
<td>KKN</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>UNP1.50.1401English</td>
<td></td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>UNP1.50.1402Religious education</td>
<td></td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>UNP1.50.1403Pancasila Education</td>
<td></td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>UNP1.50.1404Civic education</td>
<td></td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>UNP1.50.1405Indonesian</td>
<td></td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>UNP1.60.3101Entrepreneurship</td>
<td></td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>8</td>
<td>UNP1.60.5401Real Work Lecture (KKN)</td>
<td></td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

**Number of Credits:** 32

### 2) University Elective Courses
A. Choose 2 of the 18 credits of the university's choice of MK

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>T</th>
<th>P</th>
<th>L</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UNP2.60.1401</td>
<td>Basic Natural Science</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>UNP2.60.1402</td>
<td>Basic Socio-Cultural Sciences</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>UNP2.60.2101</td>
<td>Physical Fitness Education</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>UNP2.60.2102</td>
<td>Japanese</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>UNP2.60.2103</td>
<td>Multicultural Education</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>UNP2.60.2401</td>
<td>History of the Indonesian</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>UNP2.60.2402</td>
<td>Nation's Struggle</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>UNP2.60.3401</td>
<td>Natural Culture MinangKabau</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>UNP2.60.3402</td>
<td>Information and communication technology</td>
<td></td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

**Number of Credits:** 18

### 3) Faculty Compulsory Courses
A. Required

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>T</th>
<th>P</th>
<th>L</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>FMA1.60.1302</td>
<td>Calculus</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>FMA1.60.1303</td>
<td>General Physics</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>FMA1.60.2102</td>
<td>General biology</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

### 4) Study Program Compulsory Courses
A. Required

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>T</th>
<th>P</th>
<th>L</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>STAT002</td>
<td>Logic and Sets</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>STAT003</td>
<td>Elementary Algebra</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>STAT004</td>
<td>Descriptive Statistical Method</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

**Number of Credits:** 16

### B. Study Program Compulsory Courses

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>T</th>
<th>P</th>
<th>L</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>STA1.62.1001</td>
<td>Logic and Sets</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>STA1.62.1002</td>
<td>Descriptive Statistical Method</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>STA1.62.1003</td>
<td>Elementary Linear Algebra</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>STA1.62.2001</td>
<td>Inferential Statistical Method</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>STA1.62.3001</td>
<td>Chance Theory</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>STA1.62.4001</td>
<td>Mathematical Statistics</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>

**Number of Credits:** 18

### Synopsis

UNP1.60.1401 Religious Education 3 Credits
The One and Only Godhead: faith and piety, divine philosophy (Theology); Humans: human nature, human dignity, human responsibility; Law: raise awareness to obey God's law, the prophetic function of religion in law; Moral: religion as a source of morals, morals in life; Science, Technology and Arts: Faith, science and technology, and charity as a unit, the obligation to demand and practice knowledge, the responsibility of scientists and artists; Inter-religious harmony: religion is God's grace for all, togetherness in religious plurality; Society: civilized and prosperous society, the role of religious communities in realizing a civilized and prosperous society, human rights and democracy; Culture: academic culture, work ethic, open and fair attitude; Politics: the contribution of religious adherents to political life,
UNP1.60.1402 Pancasila Education 2 Credits
This course contains the meaning of urgency and reasons for the need for Pancasila education in Higher Education; Pancasila in the current history of the Indonesian nation; Pancasila as a philosophical system, as the basis of the state of the Republic of Indonesia, as a state ideology, as an ethical system, and Pancasila as the basis for the value of developing science; Thinking and implementing Pancasila in dealing with current actual problems, such as human rights, racial and economic problems, and the problem of radicalism that must be solved in accordance with the values of Pancasila.

UNP1.60.1403 Citizenship Education 2 Credits
This course contains the nature of civic education in developing full undergraduate or professional abilities; the essence and urgency of national identity as one of the determinants of nation building and character, the urgency of national integrity and national unity; the constitutional values and norms of the 1945 Constitution of the Republic of Indonesia and the constitutional provisions of the legislation under the Constitution; harmony of obligations and rights of the state and citizens in a democracy that is based on people's sovereignty and deliberation for consensus; the nature, instrumentation, and practice of Indonesian democracy based on Pancasila and the 1945 Constitution of the Republic of Indonesia; the historical dynamics of constitutional, socio-political, cultural, and contemporary contexts of sovereign law enforcement; the historical dynamics and the urgency of the insight into the archipelago as a collective conception and view of the Indonesian nationality in the context of world relations; national urgency and challenges and defend the country for Indonesia in building a collective commitment to nationality.

UNP1.60.1404 Indonesian 2 Credits
This course contains the Conception of Indonesian Language, History of Indonesian Language, Position and Functions of Indonesian Language, Indonesian Language Variety, Indonesian Spelling, (punctuation letters, words and absorption elements: Effective Sentences, Definition of Characteristics, Terms of Effective Sentences: Paragraphs Types, Functions and Developments: Writing Outline Theme, Topic, Title and Type of Outline: Writing Text (Scientific Academic Texts and Non-Academic Texts: BI Official Letters (Format and Types of Indonesian Official Letters.

UNP1.60.1405 English 2 Credits
This course contains the development of English language skills in an integrated manner by taking into account the needs of students according to their field / department, including understanding basic sentence patterns that help students understand various references in English and equip students with communication skills in English according to their field of expertise.

UNP1.60.3101 Entrepreneurship 3 Credits
This course contains knowledge, attitudes and skills based on creative and innovative thinking regarding the basic principles of entrepreneurship, entrepreneurial development models, entrepreneurial strategies, business ethics in entrepreneurship, opportunity analysis, business feasibility studies and business management (marketing, production, finance), resources, business legality, technology and information)

UNP1.60.5401 Real Work Lecture (KKN) 2 Credits
Real Work Lecture (KKN) is a field activity for students who are taking the final part of the S-1/D4/Applied Bachelor education program. This program is actually mandatory for all students, because the university believes that this program is able to encourage student empathy, and can contribute to solving problems that exist in society. Community service activities are a tangible form of the university's contribution to the community, industry, local government and community groups who want to be economically and socially independent. This KKN program requires Field Supervisors (DPL) and students to play an active role in knowing the existing problems, even before they plunge for 1 to 2.5 months in the midst of the community. Concept “working with community” has replaced concept “working for the community”.

UNP2.60.1401 Basic Natural Sciences 2 Credits
This course contains the nature and scope of the human mind and its development, the development of science, the earth and the universe the diversity of living things and their distribution, living things in natural ecosystems, natural resources and the environment, the benefits and impacts of science and technology on social life, the history of human civilization and technological developments, some important technological developments, and environmental issues

UNP2.60.1402 Basic Socio-Cultural Sciences 2 Credits
This course contains: Basic concepts in social and cultural sciences to study Indonesian society and societal changes and
Indonesian culture. The subjects are humans and human culture as individuals and human social beings, moral values and human law, human diversity and equality, science technology and human arts and the environment.

**UNP2.60.2101 Physical Fitness Education 2 Credits**
This course applies the effects and benefits of various movement activities for physical fitness and health through various games, competitions, and sports exercises and abilities. Analyze the importance of physical activity to maintain and develop and physiological functions of the body and health and can be tolerated throughout life.

**UNP2.60.2102 Japanese 2 Credits**
Japanese language courses equip students with knowledge about Japanese language practice so that students have the ability to read and communicate using Japanese.

**UNP2.60.2103 Multicultural Education 2 Credits**
This multicultural education course contains the concept of multicultural education: the urgency of multicultural education in a diverse Indonesian society, building an inclusive diversity paradigm through educational institutions. prospects and constraints of multicultural implementation, implementation of multicultural education in Indonesia, as well as character building of students through the application of multicultural ideology in the field of education.

**UNP2.60.2401 History of the Struggle of the Indonesian Nation 2 Credits**
The History of the Nation's Struggle course discusses the meaning and historical meaning of the nation's struggle, imperialism and colonialism, the struggle of the Indonesian nation against imperialism and colonialism, the Indonesian national movement, the struggle for independence, the meaning of the proclamation of efforts to maintain independence against various threats that threaten the unitary state of the Republic of Indonesia, the Republic of Indonesia.

**UNP2.60.2402 Disaster Management 2 Credits**
This course refers to Law No. 24 of 2007 concerning Disaster Management (Disaster Management) which includes the introduction of facts or evidence of disaster events, introduction of the concept of disaster, types of disasters, characteristics of disasters, natural disasters, non-natural disasters, disasters social, vulnerable, disaster / hazard (hazard), potential hazard, vulnerability, (vulnerability), capacity, principle of risk reduction (risk), prevention, mitigation, preparedness, disaster prediction, disaster impact, disaster response procedures and emergency response, analysis of rehabilitation and reconstruction needs.

**UNP2.60.3401 MinangKabau Natural Culture 2 Credits**
This course contains material on Minangkabau customs, both objective and subjective. Through the study of objective and subjective customs, students are expected to be able to understand Minangkabau human identity and be able to find the values of progress contained in adat that are relevant to the challenges of 21st century competence, namely multiculturalism, cooperation, problem solving and so on.

**UNP2.60.3402 Information and Communication Technology 2 Credits**
This course learns about information and communication technology that can make daily work easier. Understanding usage “Office Applications” software, Internet Technology, Device usage learning animation development software, technology development and application use in education and being able to recognize internet-based business.

**FMA1.60.1302 Calculus 4 Credits**
This course discusses the real number system, equations and inequalities, absolute values and absolute inequalities, coordinate systems and simple graphs, functions, limits and continuity, derivatives, related rates, graphs, and integrals.

**FMA1.60.1303 General Physics 4 Credit Points**
This course discusses quantities and units, particle kinematics, particle dynamics, work and energy, linear momentum, angular momentum and rigid bodies, static fluids, dynamic fluids, concepts of temperature and heat, and the laws of thermodynamics.

**FMA1.60.2102 General Biology 4 Credit Points**
This course discusses the knowledge of living things and scientific methods, cells as the basis of life, metabolism, structure and organization of plant and animal bodies, biodiversity, structure, functions and processes in human organ systems, ecology, genetics and evolution and biotechnology.
FMA1.60.2103 General Chemistry 4 Credit Points
This course discusses Stoichiometry, Chemical Energetics, Atomic Structure, Periodic System of Elements, Chemical Bonds and Molecular Geometry, Forms of Matter and Chemical Equilibrium.

STA1.62.1001 Logic and Sets 3 Credits
This course discusses logic: propositions, quantifiers, propositional functions, arguments, substitute rules, tautology proofs, quantified propositional functions, formation of truth values and sets: sets and their operations, Venn diagrams, Cartesian products, family of sets and index sets, set of numbers, relations and algebraic functions.

STA1.62.1002 Descriptive Statistical Method 3 Credits
This course discusses the basics of statistics: the role of statistics, statistics and statistics, statistical data, population and samples, data collection, data presentation, frequency distribution and graphs, central tendency values (mean, median, mode), location size (quartiles), deciles, percentiles, dispersion measures (range, inter-quartile range, quartile deviation, mean deviation, variance and standard deviation, standard value and coefficient of variation), moment, slope and taper.

STA1.62.1003 Elementary Linear Algebra 3 Credits
This course is the first course that teaches the basic concepts of matrices and vectors. Starting with the introduction of matrices and basic operations as well as elementary row operations (OBE) and their applications. Then proceed to the introduction of vectors and their operations. This concept is extended to the vector space R and its base search. The concept of matrices is deepened with the introduction of eigenvalues and eigenvectors. This course ends with the concept of diagonalization of arbitrary square matrices.

STA1.62.2001 Inferential Statistical Method 3 Credits
This course discusses discrete distributions (binomial distribution, geometric distribution, Poisson distribution, negative binomial distribution, hypergeometric distribution) and continuous (normal distribution, t-student distribution, chi square distribution, F distribution, exponential distribution), parameter estimation and Hypothesis test.

STA1.62.3001 Probability Theory 3 Credits
This course discusses the rules of counting (addition rules, multiplication rules, permutations, combinations, binomial coefficients), combinatorics (probability of an event, laws of probability, conditional probability, Bayes theorem, independent events), random variables (discrete random variables, continuous random variables, probability mass functions, probability solid functions, cumulative distribution function, marginal probability function, conditional probability function), and expected values (mean, variance, nth moment), Chebychev's theorem, moment generating function, linear combination moment.

STA1.62.4001 Mathematics Statistics 3 Credits
This course discusses the special probability distribution of discrete and continuous random variables, functions of random variables, sampling distribution, parameter estimation theory, estimator evaluation methods, hypothesis testing, and test evaluation methods.
Study Program: Statistics (D3)

1) Vision
To become one of the nationally reputable vocational study programs in Statistics in 2020 based on faith and piety.

2) Mission
The mission of the Statistics Study Program at the DIII level of the Mathematics Department, FMIPA UNP is:

a) Organizing structured and programmed vocational education activities by integrating theory and practice based on faith and piety (M-1).
b) Carry out research in the field of Statistics of national reputation both in the development of science and its application (M-2).
c) Carrying out community service activities with national reputation in the field of Statistics application (M-3).
d) Develop cooperation with various universities, government institutions, state-owned and private companies, both local, regional and national (M-4).

3) Purpose
The objectives of the Statistics Study Program at the DIII level of the Mathematics Department, FMIPA UNP are:

a) Produce middle statisticians who fear God Almighty, have noble character, are honest, disciplined, and are responsible (T-1.1).

b) Produce graduates who are able to compete at the national level by having the ability:
   i. apply field knowledge (T-1.2). statistics in various disciplines
   ii. use analysis statistics for study problems and find solutions to appropriate as well present them (T-1.3).
   iii. usesoftware required for statistical analysis (T-1.4).

c) Produce and improve the quality of research in the field of statistics and its applications with national reputation (T-2.1).
d) Utilizing the results of statistical and applied research to support the progress of science and technology (T-2.2).
e) Publish the results of research in the field of statistics and applied through seminars, journals, and books at the national level (T-2.3).
f) Carry out quality community service to solve problems faced by the community in the field of statistics and applications with a national reputation (T-3.1).
g) Increasing cooperation with universities, local governments, professional organizations, as well as business and industry at the local, regional, and national levels (T-4.1).

4) Graduate Competencies
Competencies of graduates of the Statistics Study Program level DIII Mathematics Department, FMIPA UNP can be formulated as follows:

1. Competence in the Field of Work:
a. Have the ability to formulate problems and develop efficient data collection designs and apply them in the form of simple surveys and standard experiments in accordance with the context of the problems encountered.
b. Able to manage and analyze data using detailed techniques with the help of statistical software and translate analysis results according to the context at hand.
c. Have the ability to present various analysis results in a form that is easily understood by users.

2. Knowledge Mastery:
Able to think deductively, inductively, logically, analytically and structured in understanding statistical methods and theories so that they can apply them correctly

3. Managerial Ability:
a. Able to communicate and cooperate with community members.
b. Able to negotiate with applied field practitioners.

4. Attitudes and Values:
a. Understanding the values of character, science, and the life of the nation and state.
b. Able to carry out work honestly, disciplined, and responsible.
c. Able to act ethically and morally.
## 5) Course Structure

**Major**: Math  
**Study program**: Statistics (D3)

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>T</th>
<th>P</th>
<th>L</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>STK1.52.6001</td>
<td>Data analysis</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>UNP1.50.1401</td>
<td>English</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>UNP1.50.1402</td>
<td>Religious education</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>UNP1.50.1403</td>
<td>Pancasila Education</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>UNP1.50.1404</td>
<td>Indonesian Citizenship</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>UNP1.50.1405</td>
<td>Education</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>UNP 1.50.3101</td>
<td>Entrepreneurship</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

### 1). Craft Skills Course (MKB)

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>T</th>
<th>P</th>
<th>L</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>STK1.52.6001</td>
<td>Data analysis</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>

### 2). University Compulsory Courses

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>T</th>
<th>P</th>
<th>L</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UNP1.50.1401</td>
<td>English</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>UNP1.50.1402</td>
<td>Religious education</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>UNP1.50.1403</td>
<td>Pancasila Education</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>UNP1.50.1404</td>
<td>Indonesian Citizenship</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>UNP1.50.1405</td>
<td>Education</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>UNP 1.50.3101</td>
<td>Entrepreneurship</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

### 3). University Elective Courses

#### A. Choose 2 Credits from 7 Credits

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>T</th>
<th>P</th>
<th>L</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UNP2.50.1401</td>
<td>Basic Socio-Cultural Sciences</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>UNP2.50.1402</td>
<td>Basic Natural Sciences</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

#### B. Choose 2 of 10 Credits

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>T</th>
<th>P</th>
<th>L</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UNP2.50.2102M</td>
<td>Multicultural education</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

#### C. Choose 2 of 6 Credits

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>T</th>
<th>P</th>
<th>L</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UNP2.50.2101</td>
<td>Japanese language</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>UNP2.50.2401</td>
<td>History of the Indonesian Nation's Struggle</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

### 4). Study Program Compulsory Courses

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>T</th>
<th>P</th>
<th>L</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>STK1.52.1001</td>
<td>Introduction to Basic Mathematics</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

### 5). Study Program Elective Courses

#### A. Choice

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>T</th>
<th>P</th>
<th>L</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>STK2.52.4003</td>
<td>Introduction to Simulation</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>
The Republic of Indonesia, as the state ideology, as an ethical system, and Pancasila as the basis for the value of developing science; Thinking and implementing Pancasila in dealing with current actual problems, such as human rights, racial and economic problems, and the problem of radicalism that must be solved in accordance with the values of Pancasila.

**UNP1.50.1404 Citizenship Education 2 Credits**

This course contains the nature of civic education in developing full undergraduate or professional abilities; the essence and urgency of national identity as one of the determinants of nation building and character, the urgency of national integrity and national unity; the constitutional values and norms of the 1945 Constitution of the Republic of Indonesia and the constitutional provisions of the legislation under the Constitution; harmony of obligations and rights of the state and citizens in a democracy that is based on people’s sovereignty and deliberation for consensus; the nature, instrumentation, and practice of Indonesian democracy based on Pancasila and the 1945 Constitution of the Republic of Indonesia; the historical dynamics of constitutional, socio-political, cultural, and contemporary contexts of sovereign law enforcement; the historical dynamics and the urgency of the insight into the archipelago as a collective conception and view of the Indonesian nationality in the context of world relations; national urgency and challenges and defending the country for Indonesia in building a national collective commitment.

**UNP1.50.1405 Indonesian 2 Credits**

This course contains the Conception of Indonesian Language, History of Indonesian Language, Position and Functions of Indonesian Language, Variety of Indonesian Language, Indonesian Spelling, (punctuation letters, words and absorption elements: Effective Sentences, Definition of Characteristics, Terms of Effective Sentences: Paragraphs, Types, Functions and Development: Writing Outline Theme, Topic, Title and Type of Outline: Writing Text (Scientific Academic Texts and Non-Academic Texts: BI Official Letters (Format and Types of Indonesian Official Letters))

**UNP 1.50.3101 Entrepreneurship 3 Credits**

This course contains knowledge, attitudes and skills based on creative and innovative thinking regarding the basic principles of entrepreneurship, entrepreneurial development models, entrepreneurial strategies, business ethics in entrepreneurship, opportunity analysis, business feasibility studies and business management (marketing, production, finance). , resources, business legality, technology and information)
**UNP2.50.1401 Basic Socio-Cultural Sciences 2 Credits**
This course contains; basic concepts of social and cultural sciences to study Indonesian society and changes in Indonesian society and culture, the subjects of which are humans and human culture and human civilization as individuals and social beings as well as moral and legal values, human harmony and equality human science, technology and art, human and environment.

**UNP2.50.1402 Basic Natural Sciences 2 Credits**
This course contains the nature and scope of the human mind and its development, the development of science, the earth and the universe the diversity of living things and their distribution, living things in natural ecosystems, natural resources and the environment, the benefits and impacts of science and technology on social life, the history of human civilization and technological developments, some important technological developments, and environmental issues.

**UNP2.50.2101 Japanese 2 Credits**
Japanese language courses equip students with knowledge about Japanese language practice so that students have the ability to read and communicate using Japanese.

**UNP2.50.2102 Multicultural Education 2 Credits**
This multicultural education course contains the concept of multicultural education: the urgency of multicultural education in a diverse Indonesian society, building an inclusive diversity paradigm through educational institutions. prospects and constraints of multicultural implementation, implementation of multicultural education in Indonesia, as well as character building of students through the application of multicultural ideology in the field of education.

**UNP2.50.2401 History of the Struggle of the Indonesian Nation 2 Credits**
The History of the Nation's Struggle course discusses the meaning and historical meaning of the nation's struggle, imperialism and colonialism, the struggle of the Indonesian nation against imperialism and colonialism, the Indonesian national movement, the struggle for independence, the meaning of the proclamation of efforts to maintain independence against various threats that threaten the unitary state of the Republic of Indonesia, the Republic of Indonesia.

**STK1.52.1001 Introduction to Basic Mathematics 3 Credits**
Elementary Mathematical Logic: propositions, quantifiers, propositional functions, arguments, substitution rules, tautological proofs, quantified proposition functions, quantified proofs of the validity and invalidity of arguments, determine the truth value of a composite proposition by arithmetic. Set Theory: sets and set operations, Venn diagrams, Cartesian products, family sets and index sets, sets of numbers, relations and set algebraic functions, cardinality.

**STK1.52.1002 Mathematics 1 3 Credits**
Real number system (properties of real numbers, inequalities, absolute values, square roots, squares, coordinate systems, equations of lines, graphs of quadratic equations); Functions and limits (functions and graphs, operations on functions, trigonometric functions, limits, continuous); Derivatives (slope of tangents, derivation rules, derivatives of sin and cos, chain rules, high-order derivatives of implicit function derivatives); Use of derivatives (maximum and minimum, monotony and concavity, optimum problem, limit at infinity, limit at infinity, graphing); Integral (indefinite integral, definite integral, definite integral properties); Transcendent Functions (original exponent and logarithm).

**STK1.52.1003 Statistical Methods 1 3 Credits**
The role of statistics, statistics and statistics, statistical data, population and samples, and data collection. Presentation of data, frequency distribution and graphs. Central tendency values: mean, median, and mode. Location measures: quartiles, decils, and percentiles. Measures of dispersion: range, inter-quartile range, quartile deviation, mean deviation, variance and standard deviation, standard value, and coefficient of variance. Moment, slope and tapering.

**STK1.52.1004 Matrix Algebra 3 Credits**

**STK1.52.1005 Introduction to Information Technology 2 Credits**
Computer systems and organization, word processing, worksheets, multimedia, and the internet.

**STK1.52.2002 Statistical Methods 2 3 Credits**
Probability distribution: discrete probability distribution, continuous probability distribution, binomial distribution, Poisson, normal, t-student, chi-square and F distribution. Sampling, sampling distribution, parameter estimation and hypothesis testing. Testing the homogeneity of multiple variances, and testing the similarity of multiple means (one-way analysis of variance).
STK1.52.2003 Algorithm and Programming 3 Credits
Understanding algorithms and programming, program structures, variables, data types, input and output statements, condition selection, loops, arrays, procedures and functions

STK1.52.2004 Introduction to Economics 3 Credits
Law of demand, law of supply, prices, consumer behavior and producer behavior as well as existing market forms in the economy. Developments in macroeconomic analysis, economic growth, inflation, unemployment, money supply and money demand. As well as other forms of government intervention in the economy.

STK1.52.2005 Demographics 2 Credits
Discusses the basics of demography, population theories, population composition and distribution, population dynamics (fertility, mortality, and population mobility), population growth, and employment, population problems and policies.

STK1.52.2006 Mathematics 2 3 Credits
Integration techniques (partial integrals, rational function integrals, trigonometric integrals); Indeterminate forms and improper integrals, Functions of two variables, Partial Derivatives, Limits and Continuous of two-variable functions, Differentiation, Chain rule, maximum and minimum, and Lagrange's method, chain rule. Double integral over square and non-square areas, double integral in polar coordinates

STK1.52.3001 Statistical Theory 1 3 Credits

STK1.52.3002 Computational Statistics 3 Credits
Introduction to SPSS and Minitab, data input and manipulation of data formats in SPSS and Minitab, descriptive statistics and graphing with SPSS and Minitab, statistical inferential analysis with SPSS and Minitab

STK1.52.3007 Database 3 Credits
Database system, data model and conceptual design, design and normalization, physical design, relational algebra, database construction.

STK1.52.3008 Applied Regression Analysis 3 Credits
Definition of regression modeling, regression parameter estimation, simple linear regression with least squares method, Correlation Analysis, Multiple and polynomial regression, regression with matrix approach, regression with more than one independent variable, Residual and Outlier Analysis, Incompatible Regression Model, Violation of Assumptions, Transformation of Model Suitability Test, Diagnostics and Influential Observations, Selection of the Best Model

STK1.52.3009 Sampling Method 3 Credits
Basic Sampling Techniques, Sampling Methods, Simple Random Sampling, Sampling Errors, Stratification Sampling, Systematic Sampling, Cluster Sampling, Sampling Techniques for Social, Business and Industrial Cases

STK1.52.3010 Exploratory Data Analysis 3 Credits
Definition of Exploratory Data Analysis, Statistical Measures for Data, Stem Leaf Charts, Letter Value Displays, Box Diagrams, Data Transformations, Resistance Lines, and Polish Medians.

STK1.52.3011 Nonparametric Statistics 3 Credit Points
The basic concepts of nonparametric, nonparametric analysis for one sample, nonparametric analysis for two or more samples that are not independent, nonparametric analysis for two or more independent samples, Goodness of fit test, and rank correlation

STK1.52.4001 Statistical Theory 2 3 Credits
STK1.52.4002 Forecasting Method 3 Credits
The use of moving average, exponential smoothing, regression analysis for forecasting time series data. Breakdown of data components, seasonal trends and residuals. Method of adjustment to seasonal factors (additive or multiplicative). Several approaches with resistant/robust methods. Estimation via autoregression model, integrated model and BoxJenkins model.

STK1.52.4003 Applied Multivariate Statistics 3 Credits
Aspects of Multivariate Analysis, Multivariate Normal Distribution, Two Population Mean Vector Inference, Multivariate Analysis of Variance, Covariance Matrix Inference, Discriminant Analysis, Principal Component Analysis, Factor Analysis, multidimensional scaling, Group Analysis.

STK1.52.4004 Survey Method 3 Credits
This course discusses how to formulate survey problems and objectives, plan surveys, determine sampling techniques and select appropriate survey objects, design questionnaires, organize and organize survey administration in the field, verify and validate data, develop entry programs, conduct field surveys, and analyze, make reports, and present the results of survey data analysis.

STK1.52.4005 Experimental Design 3 Credits

STK1.52.5001 Actuarial 3 Credits
Measurement of mortality, annuities and life insurance, changing annuities, insurance with recurring sum assured, net premium reserves, redemption value, gross premiums.

STK1.52.5002 Quality Control Statistics 3 Credits
Quality assurance in a modern business environment, Process quality modeling, Inference about process quality: Definition of Statistical Quality Control (PKS), Seven Tools in PKS. The basic concept of control chart: Concept of Variation, Limits of control chart, Type of control chart. Full map attribute . Variable control chart, multivariate control chart. Process Capability Analysis: Process Capability,, How it works Control Graph, Graph.

2018 FMIPA Academic Manual

trait controllers, variable control charts, other Statistical Process Control Techniques.

STK1.52.5003 Categorical Data Analysis 3 Credits
Definition of qualitative data, types of categorical data, logistic regression analysis (regression model, use of Minitab, analysis of model accuracy, odds ratio) several association measures, contingency tables, loglinear models, correspondence analysis.

STK1.52.5004 Research Methods 2 Credits
Scientific thinking framework in the research process: Problems, problem identification, problem formulation, hypothesis formulation, variable definition, determining population, sampling, research design, data collection tools, data collection techniques, data analysis, drawing conclusions and interpreting research results. Prepare reports systematically.

STK1.52.5005 Field Work Practice 4 Credits
Practical work is an internship activity for final year students in government and private agencies/companies that have a concern in the field of data processing/management. This activity aims to apply the knowledge/skills acquired during college and prepare prospective graduates to enter the world of work.

STK1.52.5006 Seminar 2 Credits
Students are able to analyze problems about statistics and its applications, and are able to propose alternative solutions in the form of writings and presentations.

STK1.52.6001 Data Analysis 3 Credits
Descriptive statistics for single and group structured data for various types of data scales. Examination and testing of data that includes symmetry, homogeneity of variance and normality. Estimation of parameters for one, two and k populations that are normally distributed and not, the measure of the closeness of the relationship between discrete and continuous scale variables, modeling of the relationship between discrete and continuous scale variables, and multivariate data analysis for discrete and continuous scale data.

STK1.52.6002 Management 2 Credits
Concepts, principles, approaches and processes of management in organizations. Concepts, principles, approaches and management processes in the field of work, such as offices, cooperatives, and agribusiness.

2018 FMIPA Academic Manual
5. **Study Program: Mathematics Education (S2)**

1) **Vision**
   - To become a center of excellence in the development of human resources (HR) based on Faith and Taqwa as well as a good academic culture to produce academic staff **professionals in the field of mathematics education**

2) **Mission**
   - The missions of the Postgraduate Mathematics Education Study Program at FMIPA UNP are:
     - 1) Produce graduates who have high competence and commitment in carrying out educational tasks as well as finding and developing mathematics education pendidikan
     - 2) Innovating Mathematics learning
     - 3) Forming professional teachers and having deep knowledge in learning Mathematics
     - 4) Implement quality mathematics education so that graduates are able to compete at the national level
     - 5) Develop community service in the form of cooperation with schools in quality improvement Mathematics learning at school

3) **Purpose**
   - The general objective of the proposed PPs State University Mathematics Education Masters Program is to produce graduates who have competence as professional education personnel in the field of mathematics education, both as educators, researchers and developers of mathematics education. In particular, the aim of the PPs UNP Mathematics Education Masters Study Program is to produce graduates who have:
     - Faith and Taqwa to God Almighty
     - Deep mastery in the field of science and the substance of learning mathematics education
     - Ability to increase self-potential and broaden horizons related to mathematics education
     - Ability to apply mathematics education
     - Ability to carry out research in the field of mathematics education
     - Sensitive to problems in the field of mathematics education
     - Ability to provide solutions to problems in the field of mathematics education
4) Graduate Competencies

Competencies that are expected to be possessed by graduates of the PPs UNP Mathematics Education Masters Study Program are:
- Have noble character and piety to God Almighty
- Mastering theories, concepts and facts as well as problem solving procedures in the field of mathematics education and being able to apply them in the educational process
- Understanding the characteristics of the development of students.
- Appreciating the values, habits and personalities needed as educators.
- Have the insight, skills and attitudes needed for the development of mathematics education
- Able to communicate effectively with students, peers and the community
- Able to do mathematics education research
- Able to design, implement, evaluate and compile various programs development of learning in the classroom

5) Course Structure

g. Major : Math
h. Study program : Mathematics Education (S2)

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>T</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>P</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sem</td>
</tr>
</tbody>
</table>

1). Faculty Elective Courses

A. Selection

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Development</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Curriculum</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

B. Final Project/Thesis

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>T</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>P</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sem</td>
</tr>
</tbody>
</table>

2). Study Program Compulsory Courses

A. Mandatory

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Learning</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>strategies</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mathematics</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3). Study Program Elective Courses

A. Choice

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>T</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>P</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sem</td>
</tr>
</tbody>
</table>

1) General Basic Course (7 credits)

1). Science philosophy

Discussion of the main ideas that live in the world of philosophy, and axiology as well as scientific terminology, the process of mastering knowledge, values, uses of science and its relation to technology.
2). Research methods
Discuss in depth about the steps of scientific research with several kinds of approaches, both quantitative and qualitative or other approaches by taking into account the strengths and limitations of each, so that students can submit research proposals for both theses and other research.

3). Statistics
This course discusses the basic concepts of statistics with application and interpretation, including statistical concepts, the selection of statistical analysis for individual score interpretation research problems, various correlation coefficients, prediction of randomization and error in sampling, hypothesis testing, t-test, ANOVA for randomized, block, factorial, and regression designs, as well as data analysis using computer software.

2) Basic Skills Course (3 Credits)
Scientific Foundation of Education
Provide students with the ability to recognize the socio-cultural and philosophical background of education, the interrelationship between socio-cultural life and education, and the role of education in the process of socio-cultural change. The essence of learning is sociocultural background of education and philosophical foundation of education.

3) Expertise Course I
1. Mathematics Learning Strategy
This course discusses the function of learning mathematics, various learning and teaching theories, various strategies, approaches, and methods of learning, the nature of mathematics and the psychology of mathematics learning, mathematics learning media.

2. Evaluation of Mathematics Learning
This course discusses the principles of evaluation in general, compiling evaluation instruments, processing data and interpreting evaluation results, and their use for evaluating student learning outcomes, and improving teaching in general, authentic assessment.

4) Expertise Course II
1). Number Theory
This course discusses various number systems, such as Natural numbers, Integers, Rational and Irrational numbers, Real and Imaginary numbers, Complex numbers, and their properties.

2). Geometry
This course discusses lines and angles, various flat shapes such as quadrilaterals, triangles and circles, along with their elements and properties. It also discusses various geometric shapes such as cubes, blocks, prisms, cones, tubes, and spheres and their properties, positions of points and lines in space, slices.

3). Chance Theory
This course discusses combinatoric analysis: counting techniques, permutations and combinations, probability, random variables and their distributions, mathematical expectations, and some distributions of random variables.

4). Real Analysis
This course discusses in depth the topics of set algebra, real numbers, functions, limits, derivatives, and sequences.

5). Discrete mathematics
This course discusses the topics of generating functions and their applications, recursive relations, exclusion-inclusion principles, pigeon cage principles, and graph theory.

6). Mathematical Modeling
This lecture discusses the meaning of mathematical models, designing mathematical models of factual problems in various fields such as Physics, Chemistry, Biology, Economics, Engineering and others. Here also discussed various optimization models.

7). IT-Based Learning Media
In this course, students learn various knowledge and skills about using IT to design learning media.

8). Classroom Action Research (CAR)
This course discusses: The importance of CAR in relation to teacher assignments, CAR characteristics, CAR steps, data collection techniques and instruments, and data processing techniques. The output of this lecture is a CAR proposal from each student.

9). Study School Math
In this course, students analyze the school mathematics curriculum, its sequence and depth, didactic aspects and the learning process (learning experiences, methods, forms of evaluation, etc.).

10). Math Labor Management
The course discusses efforts to optimize Mathematics Labor in order to improve the quality of the learning process, design various media for learning mathematics in elementary, middle and high school, and implement them in schools.
5) Expertise Course II (4 credits)

1) Learning Design
This course discusses important components in learning that need to be considered in lesson planning and tips for their preparation, so that students' goals will be carried out in a condition ready to learn.

2) Curriculum Development
Many things related to the curriculum are generic in nature, which applies to all fields of study, levels, pathways and types of education. Therefore, this course is designed to provide basic knowledge of the curriculum applicable to all fields study, level and “setting” of education. This consideration is based on the assumption that postgraduate students, especially in the field of education, need to master in general and thoroughly the various conceptions of the curriculum, the basics and principles of its development, as well as its implications for curriculum design, implementation of lectures from the various available alternatives.

6) Thesis Component

1) Thesis Proposal Seminar
It is a means to seek input from both students and lecturers (other than supervisors) before students go to the field to collect data.

2) Research Results Seminar
It is a means to seek input from both students and lecturers (other than supervisors) on the thesis draft with the aim of perfecting thesis writing.

3) Thesis
It is a scientific work “Masters” which contains a study of research results on a minimum of one subject matter: Quantitative or Qualitative research methods or a mixture of both or literature studies can be used with reference to Guidelines for Writing Postgraduate Thesis of Padang State University.

2. Biology Department

1) Vision, Mission, Objectives and Study Program

a. Vision
Making the Department of Biology in 2020 a professional producer of Bachelor of Biology Education and Biology, high academic culture, superior and intelligent character.

b. Mission
1) Creating a campus community with a high enthusiasm for learning.
2) Able to think critically and creatively, able to solve problems and be professional in their field.
3) Creating a conducive academic climate.
4) Equipping graduates with entrepreneurial spirit so that they can create jobs.
5) Establish and implement extensive cooperation with various relevant agencies in an effort to improve the performance of the department.

c. Destination
Produce graduates who are qualified, competitive, and able to become professionals in the field of biology and biology education.

d. Study program
The Department of Biology has two study programs, namely: Biology Education Study Program and Biology Study Program. Graduates of the Biology Education Study Program receive a Bachelor of Education (S.Pd.) degree, and graduates of the Biology Study Program receive a Bachelor of Science (S.Si.) degree.

e. Study Load
To complete the study, students of the Biology Education Study Program complete a minimum of 150 credits and students of the Biology Study Program complete a minimum of 148 credits. Completion of studies within a maximum of 14 semesters. Study Load for Study Program students: Biology Education consists of: 11 SKS MKU, 12 SKS MKDK, 58 SKS MKBK (mandatory) 10 SKS (Optional), 28 SKS MKPP, 15 SKS MKPP and 24 SKS M KK. Study load of Study Program students Biology consists of: 11 SKS MKU, 63 SKS MKK, 22 SKS MKB (mandatory) 54 SKS (Optional), 28 SKS MPB, 6 SKS MBB.
Biology Education Study Program (S1)

1) **Vision**

Making the Biology Education Study Program in 2020 an institution that produces biology and science teachers who are professional, have high academic culture, excel and have intelligent character.

2) **Mission**

a) Organizing a Bachelor of Biology Education in a professional manner, with character and relevant to the needs of Indonesian society.

b) Increasing the role as a pioneer of renewal and excellent problem solver in the field of biology education according to the needs of government and private institutions, so that they can cooperate in the development of the Biology Education Study Program at the national level.

c) To develop various scientific activities, research, training, consulting, services as well as assessment and development in the field of biology education.

3) **Destination**

a) Produce graduates who are able to become educators (teachers) of biology subjects at the secondary education level (SMA/MA) and science subjects at the elementary education level (SMP).

b) Produce graduates who are able to become researchers in the fields of biology and science education, including: learning strategies, evaluation, development of learning tools and policies.

c) Produce graduates who have the ability to manage biology education in both formal and non-formal institutions.

4) **Competence of graduates**

a) Able to apply their field of expertise and utilize science, technology, and/or art in their field in solving problems and being able to adapt to the situation at hand.

(1) Able to apply mastery of biological concepts and educational sciences in planning, implementing, evaluating learning by utilizing science and technology in accordance with problems in the classroom, laboratory, and school.

(2) Able to solve problems of biology education through scientific research by utilizing advances in science and technology in accordance with the context of the school and the development of students.

(3) Able to apply specific pedagogy to teach biological concepts by considering the characteristics of the concept and appropriate pedagogy as implementation of technological pedagogical content knowledge (TPCK).

(4) Able to communicate research results and ideas about biology education related to various alternative solutions to problems in the field of biology education (using international languages).

(5) Able to plan and implement biology learning that develops higher-order (excellent) thinking skills.

(6) Able to apply the concept of educational technology in developing biology in developing products learning by utilizing science and technology advances to support the implementation of biology learning.

b) Mastering the theoretical concepts of certain fields of knowledge in general and the theoretical concepts of special sections in that field of knowledge in depth, and able to formulating procedural problem solving.

(1) Mastering the theoretical concepts, basic principles and procedures of biology, general pedagogy, biological pedagogy, and knowledge relevant to the ability to educate to manage biology education and learning in schools.

(2) Able to analyze the biology curriculum of high school and junior high school science and also its implementation in the learning process.
(3) Mastering scientific methods to analyze and develop strategies for solving problems in biology education.

c) Able to make strategic decisions based on analysis of information and data and provide guidance in choosing various alternative solutions independently and in groups.

(1) Mastering work skills and managerial capabilities of school laboratory management by utilizing the development of science and technology.

(2) Able to solve problems of biology education through scientific research by utilizing advances in science and technology in accordance with the context of the school and the development of students both independently and in groups.

d) Responsible for their own work and can be given responsibility for the achievement of the organization's work.

(1) Have good morals, ethics, responsibility, personality and independence in completing tasks as a biology educator.

(2) Able to participate in a team and have a commitment to the development of self-potential in a sustainable manner as an educator who has character and deserves to be imitated by students and the community (excellent)

5) Course Structure

Major : Biology

Program Studies : Biology Education (S1)

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>credits</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Quantity</td>
<td>T</td>
</tr>
<tr>
<td>1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>credits</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Required</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>UNP1.60.1401</td>
<td>Religious education</td>
<td>3 3 0 0</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>UNP1.60.1402</td>
<td>Pancasila Education</td>
<td>2 2 0 0</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>UNP1.60.1403</td>
<td>Education Citizenship</td>
<td>2 2 0 0</td>
<td>2</td>
</tr>
</tbody>
</table>

2). University Elective Courses

A) Choose 2 of 18 Credits

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>credits</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>credits</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3). Faculty Compulsory Courses

A) Required

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>credits</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2018 FMIPA Academic Manual
### 4). Study Program Compulsory Courses

**A. Required**

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>Credits</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BIO1.61.1201</td>
<td>Management and Engineering laboratory</td>
<td>3 2 1 0 1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>BIO1.61.1401</td>
<td>Environmental Science</td>
<td>2 2 0 0 1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>BIO1.61.2201</td>
<td>Plant Morphology</td>
<td>3 2 1 0 2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>BIO1.61.2301</td>
<td>Animal Structure</td>
<td>3 2 1 0 2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>BIO1.61.2302</td>
<td>Plant Anatomy</td>
<td>3 2 1 0 2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>BIO1.61.3201</td>
<td>Animal Development</td>
<td>2 1 1 0 3</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>BIO1.61.3301</td>
<td>Biology Learning Media</td>
<td>3 2 1 0 3</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>BIO1.61.3302</td>
<td>Microbiology</td>
<td>3 2 1 0 3</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>BIO1.61.3303</td>
<td>Review the High School Biology</td>
<td>4 4 0 0 3</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>BIO1.61.3304</td>
<td>Protists and Fungi</td>
<td>3 2 1 0 3</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>BIO1.61.3305</td>
<td>Plant Diversity</td>
<td>3 2 1 0 3</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>BIO1.61.3306</td>
<td>Statistics for Education</td>
<td>2 2 0 0 3</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>BIO1.61.3307</td>
<td>Animal Diversity Invertebrates</td>
<td>3 2 1 0 3</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>BIO1.61.4301</td>
<td>Cell Biology</td>
<td>3 2 0 0 4</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>BIO1.61.4302</td>
<td>Animal Ecology</td>
<td>3 2 1 0 4</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>BIO1.61.4303</td>
<td>Plant Ecology</td>
<td>3 2 1 0 4</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>BIO1.61.4305</td>
<td>Animal Diversity Vertebrates</td>
<td>3 2 1 0 4</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>BIO1.61.4306</td>
<td>Biology Learning Methodology</td>
<td>3 3 0 0 4</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>BIO1.61.5201</td>
<td>Evaluation of Biology Learning</td>
<td>3 3 0 0 5</td>
<td></td>
</tr>
</tbody>
</table>

**B. Final Project/Thesis**

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>Credits</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BIO1.61.8301</td>
<td>Thesis</td>
<td>4 0 4 0</td>
<td>8</td>
</tr>
</tbody>
</table>

**Number of Credits:** 89

### 5). Study Program Elective Courses

**A. Selection**

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>Credits</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BIO2.61.1101</td>
<td>Life Education Family</td>
<td>2 2 0 0</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>BIO2.61.2201</td>
<td>Study and Study</td>
<td>2 2 0 0</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>BIO2.61.5201</td>
<td>Biology Learning Innovative</td>
<td>2 2 0 0</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>BIO1.61.5202</td>
<td>Authentic Rating</td>
<td>2 2 0 0</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>BIO1.61.5203</td>
<td>Biological Entrepreneurship</td>
<td>2 2 0 0</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>BIO1.61.6011</td>
<td>Classroom action research</td>
<td>2 2 0 0</td>
<td>6</td>
</tr>
</tbody>
</table>
### Synopsis

**UNP1.60.1401 Religious Education 3 Credits**

The One and Only Godhead: faith and piety, divine philosophy (Theology); Humans: human nature, human dignity, human responsibility; Law: raise awareness to obey God's law, the prophetic function of religion in law; Moral: religion as a source of morals, morals in life; Science, Technology and Arts: Faith, science and technology, and charity as a unit, the obligation to demand and practice knowledge, the responsibility of scientists and artists; inter-religious harmony: religion is God's grace for all, togetherness in religious plurality; Society: civilized and prosperous society, the role of religious communities in realizing a civilized and prosperous society, human rights and democracy; Culture: academic culture, work ethic, open and fair attitude; Politics: the contribution of religious adherents to political life;

**UNP1.60.1402 Pancasila Education 2 Credits**

This course contains the meaning of urgency and reasons for the need for Pancasila education in Higher Education; Pancasila in the current history of the Indonesian nation; Pancasila as a philosophical system, as the basis of the state of the Republic of Indonesia, as a state ideology, as an ethical system, and Pancasila as the state ideology

**UNP1.60.1403 Citizenship Education 2 Credits**

This course contains the nature of civic education in developing full undergraduate or professional abilities; the essence and urgency of national identity as one of the determinants of nation building and character, the urgency of national integrity and national unity; the constitutional values and norms of the 1945 Constitution of the Republic of Indonesia and the constitutional provisions of the legislation under the Constitution; harmony of obligations and rights of the state and citizens in a democracy that is based on people's sovereignty and deliberation for consensus; the nature, instrumentation, and practice of Indonesian democracy based on Pancasila and the 1945 Constitution of the Republic of Indonesia; the historical dynamics of constitutional, socio-political, cultural, and contemporary contexts of sovereign law enforcement; the historical dynamics and the urgency of the insight into the archipelago as a collective conception and view of the Indonesian nationality in the context of world relations; national urgency and challenges and defend the country for Indonesia in building a collective commitment to nationality.

**UNP1.60.1404 Indonesian 2 Credits**

This course contains the Conception of Indonesian Language, History of Indonesian Language, Position and Functions of Indonesian Language, Indonesian Language Variety, Indonesian Spelling, (punctuation letters, words and absorption elements: Effective Sentences, Definition of Characteristics, Terms of Effective Sentences: Paragraphs Types, Functions and Developments: Writing Outline Theme, Topic, Title and Type of Outline: Writing Text (Scientific Academic Texts and Non-Academic Texts: BI Official Letters (Format and Types of Indonesian Official Letters).

**UNP1.60.1405 English 2 Credits**

This course contains the development of English language skills in an integrated manner by taking into account the needs of students according to their fields/ majors, including understanding basic sentence patterns that help students understand various English references and equip students with communication skills in English according to their field of expertise.
UNP1.61.1201 Fundamentals of Education 2 Credits
Provide insight into human nature, the nature and importance of education, the foundations and principles of education, thoughts about education.

UNP1.61.2101 Educational Psychology 2 Credits
This course examines/discusses the basic concepts of educational psychology, growth, student development, intelligence, talent, creativity, motivation, memory, individual differences and learning theories.

UNP1.61.2102 Administration and Education Supervision 2 Credits
Educational Administration and Supervision courses are courses that provide insight, basic concepts and processes as well as the scope of Educational Administration and Supervision and apply them in professional school management.

UNP1.60.3101 Entrepreneurship 3 Credits
This course contains knowledge, based on creative attitude and skills thinking and basic entrepreneurship, development models model entrepreneurship, business ethics in entrepreneurship, opportunity analysis, business feasibility studies and business management (marketing, production, finance, resources, business legality, technology and information)

UNP1.61.4201 Guidance and Counseling 2 Credits
Guidance and Counseling is a compulsory university education course that provides insight and understanding of the basic concepts of BK, including; understanding, background, objectives, functions, principles, principles and code of conduct of BK, BK development fields, types of BK services, and BK protection activities as well as BK implementation operations in the implementation of the 2013 Curriculum. In addition, it also discusses the role of the Principal, Deputy Principal, subject teachers, homeroom teachers, BK teachers or counselors and other personnel as well as BK supervisors in BK services at schools.

UNP1.61.5101 Field Experience Program 1 (PPL1) 1 Credit
Provide experience for students to observe and how teachers plan to implement learning using various educational media media.

UNP1.61.6401 Field Experience Program 2 (PPL 2) 1 SKS
Provide experience for students to make observations on the attitudes and ways of teachers planning and carrying out assessments and evaluations.

UNP1.60.7401 Real Work Lecture (KKN) 2 Credits
Real Work Lecture (KKN) is a field activity for students who are taking the final part of the S-1/D4/Applied Bachelor education program. This program is actually mandatory for all students, because the university believes that this program is able to encourage student empathy, and can contribute to solving problems that exist in society. Community service activities are a tangible form of the university's contribution to the community, industry, local government and community groups who want to be economically and socially independent. This KKN program requires Field Supervisors (DPL) and students to play an active role in knowing the existing problems, even before they plunge for 1 to 2.5 months in the midst of the community. Concept “working with community” has replaced concept “working for the community”.

UNP1.61.7401 Field Experience Program 3 (PPL 3) 3 Credits
Provide real experience for students to practice teaching and other school activities for one semester.

UNP2.60.2101 Physical Fitness Education 2 Credits
This course applies the effects and benefits of various movement activities for physical fitness and health through various games, competitions, and sports exercises as well as the ability to analyze the importance of physical activity to maintain and improve health.

UNP2.60.2102 Japanese 2 Credits
Japanese language courses equip students with knowledge about Japanese language practice so that students have the ability to read and communicate using Japanese.


**UNP2.60.2103 Multicultural Education 2 Credits**

This multicultural education course contains the concept of multicultural education: the urgency of multicultural education in a diverse Indonesian society, building an inclusive diversity paradigm through educational institutions. prospects and constraints of multicultural implementation, implementation of multicultural education in Indonesia, as well as character building of students through the application of multicultural ideology in the field of education.

**UNP2.60.2401 History of the Struggle of the Indonesian Nation 2 Credits**

The History of the Nation's Struggle course discusses the meaning and significance of the history of the nation's struggle, imperialism and colonialism, the struggle of the Indonesian nation against imperialism and colonialism, the national movement Indonesia, the struggle for independence, the meaning of the proclamation effort defending independence against various threats to the Unitary undermining that State of the Republic of Indonesia, the Republic of Indonesia.

**UNP2.60.2402 Disaster Management 2 Credits**

This course refers to Law No. 24 of 2007 on Disaster Management (Disaster Management) which includes the introduction of facts or evidence of disaster events, introduction of the concept of disaster, types of disasters, characteristics of disasters, natural disasters, non-natural disasters, disasters social, vulnerable, disaster / hazard (hazard), potential hazard, vulnerability, (vulnerability), capacity, principle of risk reduction (risk), prevention, mitigation, preparedness, disaster prediction, disaster impact, disaster response procedures and emergency response, analysis of rehabilitation and reconstruction needs.

**UNP2.60.3401 MinangKabau Natural Culture 2 Credits**

This course contains material on Minangkabau customs, both objective and subjective. Through the study of objective and subjective customs, students are expected to be able to understand Minangkabau human identity and be able to find the values of progress contained in adat that are relevant to the challenges of 21st century competence, namely multiculturalism, cooperation, problem solving and so on.

**UNP2.60.3402 Information and Communication Technology 2 Credits**

This course learns about information and communication technology that can make daily work easier. Understanding usage "Office Applications" software, Internet Technology, Device usage learning animation development software, technology development and application use in education and being able to recognize internet-based business.

**FMA1.60.1301 General Biology 4 Credit Points**

This course discusses the knowledge of living things and scientific methods, cells as the basis of life, metabolism, structure and organization of plant and animal bodies, biodiversity, structure, functions and processes in human organ systems, ecology, genetics and evolution and biotechnology.

**FMA1.60.1304 General Chemistry 4 Credit Points**

This course discusses Stoichiometry, Chemical Energetics, Atomic Structure, Periodic System of Elements, Chemical Bonds and Molecular Geometry, Forms of Matter and Chemical Equilibrium.

**FMA1.60.2101 Calculus 4 Credits**

This course discusses the real number system, equations and inequalities, absolute values and absolute inequalities, coordinate systems and simple graphs, functions, limits and continuity, derivatives, related rates, graphs, and integral applications in real problems.

**FMA1.60.2104 General Physics 4 Credits**

This course discusses quantities and units, particle kinematics, particle dynamics, work and energy, linear momentum, angular momentum and rigid bodies, static fluids, dynamic fluids, concepts of temperature and heat, and the laws of thermodynamics.

**BIO1.61.1401 Environmental Science 2 Credits**

This course discusses the basics of ecology as the basis for environmental knowledge, the reciprocal relationship between humans and the environment and being able to apply the principles of environmental knowledge in everyday life.
BIO1.61.1201 Laboratory management and engineering 3 credits
This course discusses the introduction of materials, tools and work techniques, work safety in the laboratory.

BIO1.61.2301 Animal Structure 3 Credits
This course discusses the organization of the tissue and organ levels in the vertebrate animal body. The topics covered include: animal cells and basic tissues, the integumentary system, the muscular system, the skeletal system, the digestive system, the respiratory system, the circulatory system, the excretory system, the reproductive system, the nervous system and sensory organs, as well as the endocrine and neurosecretory systems.

BIO1.61.2201 Plant Morphology 3 Credits
Able to distinguish the basic structure of plant organs and be able to determine the form of plant life. Make a design and present it.

BIO1.61.2302 Plant Anatomy 3 Credits
Students are able critical thinking in explain understanding plant cells, tissues and organs and seeking use in industry, agriculture, forestry, and medicine. Student have courage, a sense of responsibility, in present assignments that are made and have honesty and scientific ethics in making a paper, discussing and understanding basic concepts about cells in plants, plant tissues, such as basic tissue, epidermal tissue, cork tissue, reinforcing tissue and transport tissue as well as the anatomy of plant organs such as roots, stems, leaves, flowers, fruits and seeds.

BIO1.61.3301 Animal Development 3 Credits
This course discusses the notion of developmental biology, developmental theories and developmental principles; gametogenesis; fertilization; cleavage; and blastulation; gastrulation; neurulation; extraembryonic membranes and placenta; organogenesis; developmental disorders; metamorphosis; and regeneration.

BIO1.61.3302 Microbiology 3 Credits
This course discusses microorganisms in general, including prokaryotic organisms and viruses, the position and role of microorganisms in life, morphology and anatomy of microorganisms, nutrition, metabolism and genetics.

BIO1.61.3303 Review of High School Biology Curriculum and Textbooks 4 Credits
The Curriculum Review course discusses the basic substance of the curriculum, comparing in the form of determining similarities and differences between the 1994 curriculum and the 2004 curriculum from various aspects. The discussion of this course includes the nature of curriculum biology along with functional links between related sciences, understanding of curriculum foundations and programs, competition standards for study materials, subject competency standards and curriculum signs, specifically exploring the structure of the curriculum.

BIO1.61.3304 Protists and Fungi 3 Credits
This course discusses diversity in the kingdoms protists, fungi, and lichens. Diversity that will be discussed includes classification, structure, stages of the life cycle and discusses procedures for exploration, collection, sampling, and preservation of protists, fungi, and lichens. Identify protists, fungi, and lichens using the key of determination, preservation, or pictures. In addition, distribution, roles, and examples of species from selected groups are discussed. Use concepts, principles, and procedures in the study of protists and fungi to find, analyze, and solve problems collaboratively.

BIO1.61.3305 Plant Diversity 3 Credits
This course discusses the basic principles of plant taxonomy, plant diversity (bryophyta, pteryophyta, and spermaphyta). Diversity that will be discussed includes classification, structure, stages of the life cycle as well as discussing procedures for exploration, collection, sampling, and making plant preservation. Make descriptions and specific characteristics of plant groups. Identify plants using the key of determination, herbarium, or pictures. In addition, distribution, roles, and examples of species from selected groups are discussed. Use concepts, principles and procedures in diversity study plant religion for find, analyze and solve problem with mutual friends.

BIO1.61.3201 Biology Learning Media 2 Credits
Teaching Materials and Learning Media Development Course Biology
aims to provide students with an understanding of how to design, compile, implement, and evaluate biology teaching materials and learning media. The process includes, analysis of the concepts to be studied, interconnections between concepts and characteristics of students to select, compile, and develop teaching materials and biology learning media. Students are invited to analyze the 2013 curriculum, high school biology materials, concepts and learning media for biology. The end result of this course is that students can compose and use teaching materials and learning media for biology.

**BIO1.61.3306 Statistics for Education 2 Credits**
This course discusses descriptive statistics commonly used in educational research and statistical inference which includes probability, theoretical distribution, sampling distribution, parameter estimation, hypothesis testing, regression and correlation, and non-parametric statistics.

**BIO1.61.3307 Diversity of Invertebrate Animals 3 Credits**
The course aims to deliver students to understand the theories, concepts, and basic principles of taxonomy, nomenclature, classification of diversity and the relationship between the structure and diversity of invertebrate animals. The material in this course covers the characteristics of animals, the history of animal development, the diversity of animal bodies, systematic background, classification systems, taxonomy.

**BIO1.61.4301 Cell Biology 3 Credits**
1. Understand the nature of cell biology and the functional relationships between related sciences. 2. Understand the concept of cells and cell structures and functions in general 3. Understand the process of cell constituent parts 4. Understand the physiological processes of cell organelles 5. Understand the cell cycle

**BIO1.61.4302 Animal Ecology 3 Credits**
This course studies and provides an understanding of the concepts, discussions, goals and interests of animal ecology, the scope, nature and approach of animal ecology studies and their applied aspects. The scope of this course covers the concept of ecosystems, animals in their ecosystems in terms of environmental factors, tolerance range, limiting factors, concepts of time, temperature, main characteristics

**BIO1.61.4303 Plant Ecology 3 Credits**
This course discusses concepts and development of plant ecology, complexity of environmental factors, populations and communities, plant demography, interspecies interactions, productivity, vegetation analysis, vegetation sampling techniques, topography, succession and terrestrial ecosystems (biomes).

**BIO1.61.4305 Vertebrate Animal Diversity 3 Credits**
Understand the concept of animal diversity, classification/taxonomy systems and skillfully apply the principles of classifying based on animal biological characteristics (morphology, anatomy, and physiology) based on observations in the laboratory and the surrounding environment, as well as communicating in writing and orally.

**BIO1.61.4306 Biology Learning Methodology 3 Credits**
Able to understand the theory of educational research methodology including non-scientific and scientific approaches, research and development of science, research problems, problem background, problem formulation, research objectives, assumptions, hypotheses, research questions, research uses, operational definitions, theoretical frameworks, types of research, research design, population, samples, sampling techniques, variables, data, instruments, data analysis techniques, writing writing scientific papers and research reports. Able to become a prospective researcher who is forward-looking, broad, creative, honest, based on knowledge and technology. Have the knowledge of conducting research and research experience as well as the growth of motivation to research. Have a foundation of mastery of research materials and practices as well as the application of research skills based on biology and biology education.

**BIO1.61.5301 Biochemistry 3 Credits**
1. Able to use science and technology in teaching Biochemistry and able to adapt to the development of Biochemistry and solve learning problems that occur in the educational environment. 2.
Organizing learning biology and science that educate and nuance PAIEM 3. Able to a. describe the notion of biochemistry, biomolecules b. describe the nature and character of carbohydrates, proteins, fats and nucleic acids c. describe the metabolism of carbohydrates, proteins, fats and nucleic acids d. explain the relationship of carbohydrates, proteins, and fats e. explain the structure, function and nomenclature of enzymes f. understand and describe energy metabolism g. understand and describe macromolecular metabolism (carbohydrate metabolism).

BIO1.61.5302 Plant Physiology 3 Credits
This course discusses: The processes of life and living activities in plants, starting from plant cells, the relationship between plants and water, soil, nutrients, enzymes, carbohydrate metabolism, photosynthesis, nitrogen metabolism, growth and development, and movement in plants.

BIO1.61.5201 Evaluation of Biology Learning Process and Outcomes 3 Credits
In this course, it will be discussed in connection with the measurement and assessment of learning outcomes, the rules for writing instruments (measuring instruments), writing/making learning outcomes measuring instruments, measurement methods, assessing learning outcomes and analyzing (determining the quality of instruments) lectures Questions and answers, discussions, exercises (large groups, smaller ones to individuals) All activities are assessed from the cognitive, psychomotor and effective aspects.

BIO1.61.5202 Biology Learning Program Development 3 Credits
This course discusses how to prepare annual programs and semester programs, syllabus and lesson plans, develop and analyze subject matter, evaluation tools and learning media, develop remedial and enrichment programs.

BIO1.61.5303 Educational Research Methodology 3 Credits
Able to understand the theory of educational research methodology including non-scientific and scientific approaches, research and development of science, research problems, problem background, problem formulation, research objectives, assumptions, hypotheses, research questions, research uses, operational definitions, theoretical frameworks, types of research, research design, population, samples, sampling techniques, variables, data, instruments, data analysis techniques, writing writing scientific papers and research reports. Able to be prospective researchers who are forward-looking, broad, creative, honest, based on knowledge and technology. Have the knowledge of conducting research and research experience as well as the growth of motivation to research. Have a foundation of mastery of research materials and practices as well as the application of research skills based on biology and biology education.

BIO1.61.5304 Genetics 3 Credits
This course discusses the history of genetic development, mitotic division and meiosis, Mendelian laws 1 and 2, Mendelian laws pseudo deviation, probability and Chi-square, sequence and crossover, Mendelian law deviation, genetic material, replication, transcription and translation, mutation genes, DNA repair, population genetics.

BIO1.61.5305 Biotechnology 3 Credits
This course discusses the definition, history and development of biotechnology, fermentation technology, enzyme immobilization, gene cloning, enzymes for DNA manipulation, PCR, stem cell and cell cloning, monoclonal antibodies and ELISA, plant genetic engineering, bioremediation, biogas, biomass and biodiesel. medical biotechnology, DNA fingerprinting, food and industrial biotechnology applications, bioethics and biosafety.

BIO1.61.6301 Human Anatomy and Physiology 3 Credit Points
This course discusses the anatomy and physiology of various organ systems in humans. This course explains the terms in human anatomy and physiology, the skeletal system in humans, the muscular system in humans, the digestive system in humans, the circulatory system in humans, understanding the respiratory system in humans, the excretory system in humans, the reproductive system in humans, and the nervous system in humans. the endocrine system in humans and the sensory system in humans.

BIO1.61.6302 Animal Physiology 3 Credits
Describe the cell as the smallest unit that performs the functions of life and biomembrane transport Describes physiological processes comparatively from low animals to higher animals and their organ structures, such as physiological processes and their organs in the digestive system, osmoregulation and excretion system, circulation system, O2/CO2 transport and respiration, nervous system, muscular system, reproductive system and endocrine system Soft skills/Character: Able to be a solid person, with good character
noble, wise, and authoritative as well as being a role model

**BIO1.61.6303 Scientific Writing 2 Credits**
This course discusses scientific writing, including: writing procedures including: writing words, terms, effective sentences and paragraphs, finding and writing writing ideas, scientific thinking, scientific writing framework, writing scientific papers and presenting scientific papers.

**BIO1.61.6304 English for Biology 2 Credits**
This course aims to provide English language skills in a specific subject, namely biology. This course learns about the importance of English lectures for Biology Education students, recognizing word structures, using context clues, reading phrases, punctuation marks, understanding paragraphs and using efficient reading techniques; skimming and scanning, understanding grammar, applying English orally and in writing, both in the form of a diary, curriculum vitae, application letter, review of articles, and review of learning materials. Students are also trained to listen to biological content using videos, as well as convey their ideas in English-language seminars in the study of biological materials.

**BIO1.61.6011 Micro learning 2 Credits**
Microteaching aims to establish and develop basic teaching competencies as a provision for teaching practice in schools/educational institutions in order to fully face teaching work in front of the class by having the knowledge, skills, skills and attitudes as professional teachers. The microteaching materials include: understanding the basics of microteaching, compiling a teaching implementation plan (RPP), forming and improving the competence of limited basic teaching skills, integrated teaching basic skills competencies, forming personality competencies, and forming social competencies.

**BIO1.61.6305 Evolution 2 Credits**
This course discusses the meaning and scope of evolution, the origin of life, classical theory of Darwinian evolution and Neodarwinism, development and challenges of Darwin's theory, evolution, genetics and the environment, evidence and evidence of evolution, variability, gene dynamics in populations, speciation, evolution. molecular, genomic evolution, and macroevolution.

**BIO1.61.7101 Research Proposal Seminar 2 Credits**
In this course, students are able to create and design a research in the form of a research proposal. Able to communicate ideas in research proposals to audiences at a scientific meeting or seminar. Students are able to defend research ideas and consider suggestions from audiences for changes to research proposals. At the end of the activity students have the character to be very thorough and master the opinions of others well.

**BIO1.61.8301 Thesis 4 Credits**
This course is for students to be able to release and write their research results in the form of a thesis as a TA as one way to get a bachelor's degree. students are able to defend the thesis they wrote on a thesis exam in front of the board of examiners. Students are also able to make a research resume that is sourced from a thesis source into a scientific article published in the form of an E-Journal.

**BIO2.61.1101 Family Life Education 2 Credits**
This course discusses how to create a prosperous and happy family.

**BIO2.61.2201 Study and Learning 2 Credits**
This course discusses the nature of learning, teaching, learning, learning characteristics, learning objectives, learning principles, learning outcomes and learning theories, including behavioristic learning theory, sociocultural revolutionary learning theory, cognitive learning theory, humanistic learning theory, learning theory multiple intelligences, and constructivist learning theory.

**BIO2.61.5201 Innovative Biology Learning 2 Credits**
This course contains the understanding, types and roles of innovation in learning, 21st century biology learning, blended learning, scientific inquiry and literacy, collaborative learning through lesson study, science/local wisdom-based biology learning, value education-based biology learning and ESQ, and ICT-based biology learning and pembelajaran E-learning.
BIO2.61.5202 Authentic Assessment 2 Credits
This course discusses the concept of authentic assessment, the characteristics of authentic assessment and authentic assessment techniques such as observation, oral questions, class presentations, projects, assignments, journals, portfolios, interviews, performance tests, experiments, concept maps, posters. Through this course, they are also trained to make instruments and rubrics for each authentic assessment.

BIO2.61.5203 Entrepreneurship Biology 2 Credits
This course discusses: entrepreneurial theory covering methods, management and implementation, entrepreneurial spirit and being able to see opportunities for biology-based entrepreneurship, being able to become prospective entrepreneurs who are forward-looking, broad, creative based on biological knowledge and technology, have entrepreneurial knowledge and experience in entrepreneurship as well as growth entrepreneurial motivation and has a foundation of mastery of entrepreneurial materials and practices as well as the application of biology-based entrepreneurial skills.

BIO2.61.6201 Information Technology-Based Learning Media 3 Credits
This course examines ICT-based learning media, which includes the basics of media ranging from the concept of learning media, the influence of information and communication technology developments on learning media and ICT-based learning innovations. This course provides provisions for students to learn to build learning media by utilizing ICT advances, such as: browsing, search engines, email, mailing lists, blogs, and web, for development e-learning.

BIO2.61.6301 Development of educational research instruments 2 credits
This course discusses the process of developing instruments for both research and evaluation. Students are trained to be able to develop instruments and make rubrics and assessments for process assessment and assessment of learning outcomes. The forms of instruments that are trained to be developed include observation instruments, questionnaires, interviews, graded scales, sociometry, checklists.

BIO2.61.6101 Class 2 Action Research Credits
This course aims to make students understand the writing of scientific papers comprehensively. Lecture materials include the meaning of articles and scientific works, guidelines for articles and scientific works, language and punctuation, steps and systematic writing of scientific papers, methods of writing journals and methods of referring to citations, how to write scientific papers, rules of referring to citations, how to refer, language of writing scientific papers, systematic writing of scientific papers

BIO2.61.6102 Management of Educational Institutions 2 Credits
This course studies the introduction to management of educational institutions, the basic functions of management of educational institutions, educational organizations, school-based management and higher education, educational leadership models, management information systems, vision, mission, goals and standards of national education, curriculum and learning management, management of quality improvement and education cooperation, management of problems in education, laboratory management, management of teacher professional development, and accreditation of educational institutions.

BIO2.61.7101 Learning Biology in English 2 Credits
This course discusses the importance of teaching skills in English, the identification of English words used in learning with pronunciation good and correct ways, how to open learning, give perception, motivation, ask questions, provide reinforcement, deliver biology material, class management, and close learning in English, and make plans in English, implement it in class, and design evaluations, remedial programs and enrichment in English.

BIO2.61.7102 Development of School Biology Practicum 2 Credits
This course aims to provide an understanding or insight into the nature, role and function of practicum as well as being able to design and manage practicum activities in the learning process. This lecture contains the understanding of practicum, the objectives and functions of the practicum, choosing the concept of material to be practiced based on the analysis of the breadth and depth in the curriculum, planning practicum activities, planning tool models and types of materials and tools to be used in the practicum, carrying out the manufacture and assembling of tool models as well as compiling guidelines for its use (LKS), conducting testing of tool models and their guidelines, making improvements to tool models and guidelines based on test results, preparing teaching plans.

2018 FMIPA Academic Manual 130

2018 FMIPA Academic Manual 131
Biology Study Program (S1)

1) Vision
Making the Biology Study Program a superior and dynamic center of education, research, and development in order to produce Bachelor of Science in the field of biology who has faith and devotion to God Almighty, and is able to apply and develop science and technology in society.

2) Mission
a) Creating a campus community with a high enthusiasm for learning.
b) Creating a conducive academic climate.
c) Equipping candidates for Bachelor of Science with biological sciences, so that graduates are expected to be able to think critically and creatively, be able to solve problems, and be professional in their fields.
d) Equipping candidates for Bachelor of Science with an entrepreneurial spirit so that they can create jobs.
e) Cooperating with various related institutions (especially research/study institutions and centers, laboratories of government and private institutions) in an effort to improve the quality of study program graduates and assist problems found in the field.

3) Purpose
Produce a Bachelor of Science in professional biology, independent ability, soulful entrepreneur ip, and able carry out research to develop solutions to problems biology and found in life. Public. In 2020, BIOLOGY PRODI will become one of the centers for the study of Biology based on biotechnology to support the development and quality improvement in agriculture and animal husbandry in West Sumatra Province (in particular) and Sumatra (generally).

4) Graduate Competencies
a) Main Competencies
(1) Mastering biological material.
(2) Have work skills in the biology laboratory and in the field.
(3) Able to develop knowledge and be able to follow the development of science and technology needed to develop themselves.
(4) Able to think logically, analytically, and structured in solving problems found in the world of work and society.

b) Supporting Competencies
(1) Able to continue their studies to a higher level.
(2) Able to communicate orally/written in the national language and international.
(3) Mastering information technology.

5) Course Structure
Major : Biology
Study program : Biology (S1)

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>credits</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Quantity</td>
<td>T</td>
</tr>
<tr>
<td>1.</td>
<td></td>
<td>1. Science and Skills Course (MKK)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Selection</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>FMA023 General Chemistry</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of Credits</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td>2. Craft Skills Course (MKB)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Required</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>FMA022 Environmental Knowledge</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of Credits</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td>3. University Compulsory Courses</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Required</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>UNP1.60.1401Religious education</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>UNP1.60.1402Pancasila Education</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>UNP1.60.1403Education Citizenship</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>UNP1.60.1404Indonesian</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
<td>UNP1.60.1405English</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of Credits</td>
<td>11</td>
<td>11</td>
</tr>
</tbody>
</table>

2018 FMIPA Academic Manual
<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>credits</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>4) University Elective Courses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>A. Choose 2 of 18 Credits</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>UNP2.60.1402</td>
<td>2 2 0 0 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>UNP2.60.1402</td>
<td>2 2 0 0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Number of Credits</strong></td>
<td>2 2 0 0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>5). Faculty Compulsory Courses</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>A. Required</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>FMA1.60.1301</td>
<td>4 3 1 0 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>FMA1.60.1302</td>
<td>4 3 1 0 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>FMA1.60.1303</td>
<td>4 3 1 0 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>FMA1.60.1304</td>
<td>4 3 1 0 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Number of Credits</strong></td>
<td>16 12 4 0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>6). Study Program Compulsory Courses</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>A. Required</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>BIO1.62.1001</td>
<td>2 2 0 0 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>BIO1.62.2004</td>
<td>3 2 1 0 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>BIO1.62.2005</td>
<td>3 2 1 0 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>BIO1.62.2006</td>
<td>4 3 1 0 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>BIO1.62.2007</td>
<td>3 2 1 0 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>BIO1.62.3003</td>
<td>3 2 1 0 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>BIO1.62.3004</td>
<td>3 2 0 0 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>BIO1.62.3005</td>
<td>3 2 1 0 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>BIO1.62.3006</td>
<td>3 2 1 0 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>BIO1.62.3007</td>
<td>3 2 1 0 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>BIO1.62.3008</td>
<td>4 3 1 0 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>BIO1.62.4001</td>
<td>3 2 1 0 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>BIO1.62.4002</td>
<td>3 2 1 0 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>BIO1.62.4003</td>
<td>3 2 1 0 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>BIO1.62.4004</td>
<td>3 2 1 0 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Number of Credits</strong></td>
<td>84 63 13</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>B. Final Project/Thesis</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>BIO1.62.8001</td>
<td>4 4 0 0 8</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Number of Credits</strong></td>
<td>4 4 0 0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>7). Study Program Elective Courses</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>A. Selection</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>BIO2.62.5001</td>
<td>2 2 0 0 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>BIO2.62.5002</td>
<td>2 1 1 0 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>BIO2.62.5003</td>
<td>2 2 0 0 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>BIO2.62.5004</td>
<td>2 2 0 0 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>BIO2.62.5005</td>
<td>2 2 0 0 5</td>
<td></td>
</tr>
</tbody>
</table>
### Courses and Credits

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>credits</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Quantity</td>
<td>T</td>
</tr>
<tr>
<td>6</td>
<td>BIO2.62.5006</td>
<td>Phytosteroids</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>BIO2.62.5007</td>
<td>Taxonomy of Angiosperms</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>BIO2.62.5008</td>
<td>Plant Ecophysiology</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>BIO2.62.5009</td>
<td>Marine Biology</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>BIO2.62.6001</td>
<td>Cell Genetics</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>11</td>
<td>BIO2.62.6002</td>
<td>Phytopathology</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>12</td>
<td>BIO2.62.6003</td>
<td>Weed Science</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>13</td>
<td>BIO2.62.6004</td>
<td>Endocrinology</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>14</td>
<td>BIO2.62.6005</td>
<td>mycology</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>15</td>
<td>BIO2.62.6006</td>
<td>Soil Microbiology</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>16</td>
<td>BIO2.62.6007</td>
<td>Wetland Ecology</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>17</td>
<td>BIO2.62.6008</td>
<td>Microbial Physiology</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>18</td>
<td>BIO2.62.6009</td>
<td>Molecular Genetics</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>19</td>
<td>BIO2.62.6010</td>
<td>Herpetology</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>20</td>
<td>BIO2.62.6011</td>
<td>ornithology</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>21</td>
<td>BIO2.62.6012</td>
<td>Ethnobotany</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>22</td>
<td>BIO2.62.6013</td>
<td>Population Genetics</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>23</td>
<td>BIO2.62.6014</td>
<td>Teratology</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>24</td>
<td>BIO2.62.6015</td>
<td>Stress Physiology Plant</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>25</td>
<td>BIO2.62.6016</td>
<td>Immunology</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>26</td>
<td>BIO2.62.6017</td>
<td>Hydroponics</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>27</td>
<td>BIO2.62.6018</td>
<td>Resource Conservation Natural</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>28</td>
<td>BIO2.62.6019</td>
<td>palinology</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>29</td>
<td>BIO2.62.6020</td>
<td>Microbial Genetics</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>30</td>
<td>BIO2.62.7001</td>
<td>Industrial Microbiology</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>31</td>
<td>BIO2.62.7002</td>
<td>Food Microbiology</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>32</td>
<td>BIO2.62.7003</td>
<td>Environmental Toxicology</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>credits</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Quantity</td>
<td>T</td>
</tr>
<tr>
<td>33</td>
<td>BIO2.62.7004</td>
<td>Animal Tissue Culture</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>34</td>
<td>BIO2.62.7005</td>
<td>Bioethics</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>35</td>
<td>BIO2.62.7006</td>
<td>Parasitology</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>36</td>
<td>BIO2.62.7007</td>
<td>Entomology</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>37</td>
<td>BIO2.62.7008</td>
<td>mammology</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>38</td>
<td>BIO2.62.7009</td>
<td>Plant Metabolism</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>39</td>
<td>BIO2.62.7010</td>
<td>Plant Specimen Collection and Management</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>40</td>
<td>BIO2.62.7011</td>
<td>Medical Microbiology</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>41</td>
<td>BIO2.62.7012</td>
<td>Human Genetics</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>42</td>
<td>BIO2.62.7013</td>
<td>Disease control Plant</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>43</td>
<td>BIO2.62.7014</td>
<td>Seed Structure</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>44</td>
<td>BIO2.62.7015</td>
<td>Food and Nutrition</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>45</td>
<td>BIO2.62.8001</td>
<td>Animal Specimen Collection and Management</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>46</td>
<td>BIO2.62.8002</td>
<td>Plant Population Ecology</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>47</td>
<td>BIO2.62.8003</td>
<td>Nutrient Metabolism</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

**Synopsis**

**UNP1.60.1401 Religious Education 3 Credits**

The One and Only God: faith and piety and philosophy of god (Theology); Humans: human nature, human dignity, human responsibility; Law: raise awareness to obey God's law, prophetic function of religion in law; Moral: religion as a source of morals, morals in life; Science, Technology and Arts: Faith, science and technology, and charity as a unit, the obligation to demand and practice knowledge, the responsibility of scientists and artists; inter-religious harmony: religion is God's grace for all, togetherness in religious plurality; Society: civilized and prosperous society, the role of the people
religion in realizing a civilized and prosperous society, human rights and
democracy; Culture: academic culture, work ethic, open and fair attitude;
Politics: the contribution of religious adherents in political life, the role of
religious adherents in realizing national unity and integrity.

**UNP1.60.1402 Pancasila Education 2 Credits**
This course contains the meaning of urgency and reasons for the need for
Pancasila education in Higher Education; Pancasila in the current history of the
Indonesian nation; Pancasila as a philosophical system, as the basis of the
state of the Republic of Indonesia, as a state ideology, as an ethical system,
and Pancasila as the basis for the value of developing science; Thinking and
implementing Pancasila in dealing with current actual problems, such as
human rights, racial and economic problems, and the problem of radicalism
that must be solved in accordance with the values of Pancasila.

**UNP1.60.1403 Citizenship Education 2 Credits**
This course contains the nature of civic education in developing full undergraduate or
professional abilities; the essence and urgency of national identity as one of the
determinants of nation building and character, the urgency of national integrity and
national unity; the constitutional values and norms of the 1945 Constitution of the
Republic of Indonesia and the constitutional provisions of the legislation under the
Constitution; harmony of obligations and rights of the state and citizens in a democracy
that is based on people’s sovereignty and deliberation for consensus; the nature,
instrumentation, and practice of Indonesian democracy based on Pancasila and the 1945
Constitution of the Republic of Indonesia; the historical dynamics of constitutional, socio-
political, cultural, and contemporary contexts of sovereign law enforcement; the
historical dynamics and the urgency of the insight into the archipelago as a collective
conception and view of the Indonesian nationality in the context of world relations;
national urgency and challenges and defend the country for Indonesia in building a
collective commitment to nationality.

**UNP1.60.1404 Indonesian 2 Credits**
This course contains the Conception of Indonesian Language, History of Indonesian
Language, Position and Functions of Indonesian Language, Indonesian Language
Variety, Indonesian Spelling, (punctuation letters, words and absorption elements:
Effective Sentences, Definition of Characteristics, Terms of Effective Sentences:
Paragraphs Types, Functions and Developments: Writing Outline Theme, Topic, Title and
Type of Outline: Writing Text (Scientific Academic Texts and Non-Academic Texts: BI
Official Letters (Format and Types of Indonesian Official Letters.

**UNP1.60.1405 English 2 Credits**
This course contains the development of English language skills in an
integrated manner by taking into account the needs of students according to
their fields/ majors, including understanding basic sentence patterns that help
students understand various English references and equip students with
communication skills in English according to their field of expertise.

**UNP2.60.1402 Basic Socio-Cultural Sciences 2 Credits**
This course contains: Basic concepts in social and cultural sciences to study
Indonesian society and changes in Indonesian society and culture. The
subjects are humans and human culture as individuals and human social
beings, moral values and human law, human diversity and equality, science,
technology and human arts and the environment.

**FMA1.60.1301 General Biology 4 Credit Points**
This course discusses the knowledge of living things and scientific methods,
cells as the basis of life, metabolism, structure and organization of plant and
animal bodies, biodiversity, structure, functions and processes in human organ
systems, ecology, genetics and evolution and biotechnology.

**FMA1.60.1302 Calculus 4 Credits**
This course discusses the real number system, equations and inequalities,
absolute values and absolute inequalities, coordinate systems and simple
graphs, functions, limits and continuity, derivatives, related rates, graphs, and
integrals.

**FMA1.60.1303 General Physics 4 Credit Points**
This course discusses quantities and units, particle kinematics, particle
dynamics, work and energy, linear momentum, angular momentum and rigid
bodies, static fluids, dynamic fluids, concepts of temperature and heat, and the
laws of thermodynamics.

**FMA1.60.1304 General Chemistry 4 Credit Points**
This course discusses Stoichiometry, Chemical Energetics, Atomic Structure,
Periodic System of Elements, Chemical Bonds and Molecular Geometry, Forms of
Matter and Chemical Equilibrium.
**BIO1.62.1001 Environmental Knowledge 2 Credits**
The learning outcomes in this course are: 1. Able to master the basics of ecology as the basis of environmental knowledge 2. Understand the reciprocal relationship between humans and the environment 3. Understand the reciprocal relationship between human activities and the environment 4. Able to apply the principles of environmental knowledge in life daily Soft skills/Character: Able to become a person who has empathy for environmental sustainability and is grateful for the blessings of the universe created by God Almighty.

**BIO1.62.2004 Plant Morphology 3 Credits**
1. Able to apply plant morphology and utilize science and technology to the development of plant morphology science in solving problems and being able to adapt to the situation at hand. 2. Mastering theoretical concepts of plant morphology in general, and theoretical concepts of special sections in the field of plant morphology in depth and able to formulate procedural problem solving 3. Able to make the right decisions based on analysis of information and data, and able to provide instructions in choosing various alternative solutions independently and in groups 4. Responsible for own work and can be given responsibility for achieving organizational work resultsSoft Skills/Character: Open and big-hearted, thorough and critical, strategic in thinking and acting, and humble.

**BIO1.62.2005 Animal Structure 3 Credits**
This course discusses the organization of the tissue and organ levels in the vertebrate animal body. The topics covered include: animal cells and basic tissues, the integumentary system, the muscular system, the skeletal system, the digestive system, the respiratory system, the circulatory system, the excretory system, the reproductive system, the nervous system and sensory organs, as well as the endocrine and neurosecretory systems. Competency standards; After following this course, students are expected to be able to understand: a. Animal cell structure b. The structure of the tissue that makes up the body of vertebrate animals c. The structure of the organs that make up the body of vertebrate animals

**BIO1.62.206 Animal Taxonomy 4 Credits**
1. Know the basics of animal taxonomy and nomenclature and apply 2. Identify and classify animals

Based on phylogenetic and morphological classification. 3. Recognize the nature and characteristics of animals. 4. Classify animals and provide examples to the level of taxon class and order. 5. Develop a lineage tree scheme from animal classification. 6. Develop a method for observing the determination, identification and classification of animals. Soft skills/Character: Able to recognize individual potential, carry out effective communication in classifying animals and be active in learning activities

**BIO1.62.2007 Plant Anatomy 3 Credits**
Able to master the theoretical concepts about cells and cell forms in plants. Able to master the theoretical concepts of tissue in plants. Able to master theoretical concepts specifically about the anatomical structure of plant organs organ

**BIO1.62.3003 Animal Development 3 Credits**
This course discusses the notion of developmental biology, developmental theories and developmental principles; gametogenesis; fertilization; cleavage; and blastulation; gastrulation; neurulation; extraembryonic membranes and placenta; organogenesis; developmental disorders; metamorphosis; and regeneration

**BIO1.62.3004 Cell Biology 3 Credit Points**
1. Understand the nature of cell biology and the functional relationships between related sciences. 2. Understand the concept of cells and cell structures and functions in general 3. Understand the process of cell constituent parts 4. Understand the physiological processes of cell organelles 5. Understand the cell cycle Soft Skills/Character: Integrating the values of honesty, objective, fair, and responsible in carrying out cell biology learning.

**BIO1.62.3005 Biochemistry 3 Credits**
1. Able to use science and technology in teaching Biochemistry and able to adapt to the development of Biochemistry and solve learning problems that occur in the educational environment. 2. Organizing biology and science learning that educates and has PAIEM nuances 3. Able to a. describe the notion of biochemistry, biomolecules b. describe the nature and character of carbohydrates, proteins, fats and nucleic acids c. describe the metabolism of carbohydrates, proteins, fats and nucleic acids d. explain the relationship of carbohydrates, proteins, and fats e. 2018 FMIPA Academic Manual

2018 FMIPA Academic Manual
explain the structure, function and nomenclature of enzymes f. understand and describe energy metabolism g. understand and describe macromolecular metabolism (carbohydrate metabolism, protein metabolism, fat metabolism) h. able to understand and explain the effect of addictive substances on the body

Soft Skills/Character: Able to recognize individual potential, carry out effective communication in analyzing problems in the metabolism of macromolecular substances (proteins, carbohydrates, fats and nucleic acids) and active in learning activities

BIO1.62.3006 Plant Ecology 3 Credits
1. Understand the concept and development of plant ecology. 2. Understand the effect of the complexity of environmental factors on plants. 3. Understand the concept of population and plant community 4. Able to identify forms of intra and inter-species interactions 5. Able to explain the concept of productivity 6. Able to observe changes in community and plant demographics 7. Able to perform plant vegetation analysis 8. Able to perform vegetation sampling technique 9. Can distinguish characteristics of vegetation types in the world

Soft skills/Character: Able to recognize individual potential, carry out effective communication in applying ecological principles in life and play an active role in learning activities

BIO1.62.3007 Animal Ecology 3 Credits
This course studies and provides an understanding of the concepts, discussions, goals and interests of animal ecology, the scope, nature and approach of animal ecology studies and their applied aspects. The scope of this course covers the concept of ecosystems, animals in their ecosystems in terms of environmental factors, tolerance range, limiting factors, concepts of time, temperature, the main characteristics of animals as heterotrophs, endothermal, exothermic, species as ecological indicators, habitats and niches, food chains and webs, interspecific relationships, succession, response and adaptation. Population and population dynamics which includes structure, sex ratio, age group, density and distribution. Population growth; the concept of selected k and selected species k and growth curve

BIO1.62.3008 Taxonomy of Plants 4 Credits
1. Able to explain the basics of plant taxonomy, plant classification klasifikasi Spermatophyta. 2. Able to make descriptions and find specific characteristics of selected families 3. Able to identify plants using determination keys and herbarium or pictures 4. Able to make the correct plant herbarium. Soft skills/Character: Able to be a diligent, thorough, honest and professional person in the field of plant taxonomy

This course discusses the basic concepts of taxonomy (identification, classification, nomenclature), diversity, development of classification of non-flowering plants which includes algae (Vyanophyta, Chlorophyta, Phaeophyta, Rhodopyta, Euglenophyta); Fungi, Lichens, Bryophyta and Pterydophyta, and the relationship between non-flowering plants. It also discusses the distribution and benefits as well as examples of species from selected orders.

BIO1.62.4001 Animal Physiology 3 Credits
Describe the cell as the smallest unit that performs the functions of life and biomembrane transport Describes physiological processes comparatively from low animals to higher animals and their organ structures, such as physiological processes and their organs in the digestive system, osmoregulation and excretion system, circulation system, O2/C02 transport and respiration, nervous system, muscular system, reproductive system and endocrine system

Soft skills/Character: Being able to be a solid person, having noble character, wisdom, and authority and being a role model

BIO1.62.4002 Plant Physiology 3 Credits
This course discusses the processes of life and living activities in plants, starting from the relationship of plants to water, soil and nutrients, carbohydrate metabolism, photosynthesis, nitrogen metabolism, to producing growth and movement in plants.

BIO1.62.4003 Animal Morphogenesis 3 Credits
Animal Morphogenesis provides lectures on the induction of tissue morphogens during animal development to form organs and body tissues. The role of inducers and responsiveness in eliciting the initiation of organ formation. and termination of morphogenesis.

BIO1.62.4004 Plant Morphogenesis 3 Credit Points
Plant morphogenesis discusses the understanding of morphogenesis and the concepts of morphogenesis, morphogenesis phenomena, morphogenetic factors, growth substances (growth regulators and plant organization). Soft skills/Character: Able to be a diligent, thorough, honest and professional person in the field of plant taxonomy

2018 FMIPA Academic Manual
BIO1.62.4005 Basic Microbiology 3 Credits
This course discusses microorganisms in general, including prokaryotic organisms and viruses, the position and role of microorganisms in life, morphology and anatomy of microorganisms, nutrition, microbial metabolism and genetics, various symbiotic associations in microorganisms, the role of microbes in immune responses.

BIO1.62.4006 Statistics 3 Credits

BIO1.62.4007 Genetics I 2 Credits
Utilization of science and technology in teaching genetics, theories and laws contained in the discussion of genetics and being able to adapt to the development of genetics science and solve genetic problems that occur in life. 2. Able to design genetic learning in accordance with the grouping of materials at the level of the education unit 3. Able to solve problems and apply the principles, laws and theories of genetics through problem analysis and experimental data analysis. 4. Responsible for his own work and can be given responsibility for the achievement of the organization's work. Soft skills: Character: Able to recognize individual potential, carry out effective communication in analyzing and solving genetic problems and active in learning activities

BIO1.62.4008 Research Methods and Experimental Design 3 Credits
This course discusses the concepts of biostatistics including descriptive statistics, parametrics, analysis of variance, experimental digestion, environmental design in the form of Completely Randomized Design, Randomized Block Design, One-factor and two-factor (factorial) experiments, correlation and regression, data transformation, further testing and training in the application of statistical techniques to process data and interpret biological research data

BIO1.62.4009 Biotechnology 3 Credits
1. Able to master the science of biotechnology for undergraduate level 2. Able to carry out modern biotechnology practicum correctly 3. Able to make reports from field study activities to biotechnology/molecular biology laboratories 4. Able to tell the results of the latest research in the field of biotechnology from reading journals 5. Able to apply biotechnology knowledge obtained from literature study activities, practicum, and field studies in the form of research proposals. Soft skills: Character: Be a student who is diligent, tenacious, tough, patient, and aware of the power of Allah SWT.

BIO1.62.4010 Evolution 2 Credits

BIO1.62.5001 Microtechnical 3 Credits
This course discusses how to make permanent or semi-permanent preparations from animal and plant tissues using the Paraffin method which includes sampling techniques, fixation, dehydration, clearing, embedding, sectioning, mounting, staining, and Documentation with microphotography techniques. Whole Mounting for protozoa was also carried out by the Barlsh method.

BIO1.62.5002 Genetics II 2 Credits
1. Able to utilize science and technology in teaching genetics, theories and laws contained in the discussion of genetics and able to adapt to the development of genetics science and solve genetic problems that occur in life. 2. Able to master the theoretical concepts of genetics in general, theories, principles and laws in in-depth genetics and be able to formulate procedural problem solving to be able to act as a biology teacher or science teacher. 3. Responsible for own work and can be given responsibility
on the achievement of the organization's work. **Soft Skills/Character:** Able to recognize individual potential, carry out effective communication in analyzing and solving genetic problems and active in learning activities

**BIO1.62.6001 Human Anatomy and Physiology 3 Credit Points**
1. Able to understand the definition of human anatomy and physiology as well as terms in Human Physiological Anatomy. 2. Able to understand the integumentary system in humans. 3. Able to understand the Skeleton system in humans. 4. Able to understand the Muscular system in humans. 5. Able to understand the Digestive system in humans. 6. Able to understand the Circulatory system in humans. 7. Able to understand the Respiratory system in humans. 8. Able to understand the Excretory system in humans. 9. Able to understand the Human reproductive system. 10. Able to understand the Nervous system in humans. 11. Able to understand the Endocrine system in humans. 12. Able to understand the Sensory system in humans.

**BIO1.62.6002 Seminar 2 Credits**
In this course, students are able to create and design a research in the form of a research proposal. Able to communicate ideas in research proposals to the audience at a scientific meeting or seminar, students are able to defend research ideas and consider suggestions from the audience for changes to research proposals. At the end of the activity, students have the character to be very thorough and master the opinions of others well.

**BIO1.62.6003 Seed Physiology 2 Credits**
Introduction, Conception of seeds or seeds, Formation of seeds and fruit, Structure of seeds and fruit, Structure and types of seeds, Ripening of seeds, (physiological maturity, germination and growth of seeds, biological processes in the period of seed ripening). Seed germination, (definition of germination, requirements for germination), morphological and physiological germination process, Germination substrate, Normal germination criteria, Dormancy, Seed decline

**BIO1.62.6004 Seminar 2 Credits**
Students prepare and make proposals for research.

**BIO1.62.7001 Scientific Writing 2 Credits**
This course provides knowledge and skills in writing scientific papers which include writing procedures according to Indonesian guidelines which include writing words, vocabulary, sentences, paragraphs, terms, effective sentences, looking for writing ideas, how to put ideas into writing, free writing, think scientifically, recognize the framework of scientific writing and write scientific papers in the form of theory and practice by making presentations of scientific papers and tentative proposals.

**BIO1.62.7002 Internship 3 Credits**
This course provides an opportunity for students to directly communicate all the biological knowledge they have received so far in the world of work, including Research Centers, Industry, Animal Husbandry, Agriculture and the Center for Biotechnology Development (Nuclear reactors). Students for 83 hours of work are in the Industrial Workplace with Internship status. At the end of this activity, students must report the KP in the form of the writing the KP Report which is guided by 1 Lecturer and 1 Supervisor in the Field.

**BIO1.62.7003 Learning Biology 3 Credits**
**Learning Outcomes** in this course are: 1. Able to master and apply the nature of learning biology, teacher code of ethics, teacher competence, and basic skills of teachers in learning biology. 2. Able to master the concepts of approaches, methods, strategies, and learning models that can be used in learning biology. 3. Able to master concepts and analyze high school biology learning materials. 4. Able to master the concept of learning media and its types. 5. Able to choose and use appropriate learning media to be used in biology learning based on the analysis of the learning materials carried out. 6. Able to analyze the 2013 curriculum in biology for high school, and able to develop learning tools based on the result of the analysis of the curriculum. 7. Able to carry out biology learning based on the design that has been developed. 8. Able to master and design the concept of remedial and enrichment learning in biology learning. 9. Able to master and apply the concept of competency-based assessment in the process and learning outcomes of high school students in biology subjects. 10. Able to assemble cognitive assessment instruments in the form of objectives and essays, as well as affective and psychomotor assessment instruments in biology learning. 11.
Able to use assessment instruments through trials and analyze test instruments. 12. Able to apply assessments to provide information about students’ learning achievement in biology in the learning outcomes report document. Soft Skills/Character: Integrating the values of honesty, objective, fair, and responsible in carrying out biology learning.

**BIO1.62.7004 Research Proposal Seminar 2 Credits**

In this course, students are able to create and design a research in the form of a research proposal. able communicate ideas in research proposals to the audience at a scientific meeting or seminar, students are able to defend research ideas and consider suggestions from the audience for changes to research proposals. At the end of the activity students have the character to be very thorough and master the opinions of others well.

**BIO1.62.8001 Thesis 4 Credits**

This course is for students to be able to release and write their research results in the form of a thesis as a TA as one way to get a bachelor’s degree. students are able to defend the thesis they wrote on a thesis exam in front of the board of examiners. Students are also able to make a research resume that is sourced from a thesis source into a scientific article published in the form of a thesis journal.

**BIO2.62.5001 Basic Social and Cultural Sciences 2 Credits**

This course provides insight into living with social values in the midst of a society of diverse cultures to get to know each other that diversity so as to strengthen national unity.

**BIO2.62.5002 Plant Tissue Culture 2 Credits**

This course provides an overview and skills for students about the concepts and principles of tissue culture 2. Able to master about tissue culture laboratory facilities 3. Able to master about tissue culture media and their preparation 4. Able to master methods of preparing explants 5. Able to master acclimatization procedures plantlet 6. Able to master about the factors that influence the success of plant tissue culture techniques 7. Able to master about callus culture 8. Able to master about the use of growth regulators (ZPT) in culture. 9. Able to master the production of secondary metabolites, Soft Skills/Character: Able to be a person who is steady, has character, has noble character, is wise, authoritative, and can be an example

**BIO2.62.5003 Biofertilizer 2 Credits**

This course discusses the process of forming/manufacturing organic fertilizer by utilizing the fermentation process to improve the quality of the nutrients produced in the form of ready-to-use organic fertilizer.

**BIO2.62.5004 Environmental Impact Analysis 2 Credits**


**BIO2.62.5005 Vertebrate Reproductive Physiology 2 Credits**

Discusses sex and sex steroids, gonadal function and regulation of gonadal and pituitary function, steroid action in adult animals, fertilization, implantation and formation of the placenta, factors that support pregnancy, preparation for birth, childbirth and breastfeeding and parental care. Soft skills/Character: Being able to be a solid person, having noble character, wisdom, and authority and being a role model.

**BIO2.62.5006 Phytohormones 2 Credits**

In this course, the definition, mechanism of action is discussed phytohorman, various phytohormones: auxin, gibberellins, cytokinins, eliten, abisc acid, mechanism of action and physiological effects of each phytohormon and its transporters. other plant organic compounds substances that slow down growth allelochemicals.

**BIO2.62.5007 Taxonomy of Angiosperms 2 Credits**

Basic concepts of plant taxonomy, taxonomic history and reporting, nomenclature, variation and speciation, characteristics, general description and classification of several species in Magnoliopsida, Liliopsida, Algae, Ferns and Lichenes.
\textbf{BIO2.62.5008 Plant Ecophysiology 2 Credits}

Students are able to utilize science and technology in the field of plant physiology ecology and are able to adapt to situations encountered in solving problems. \textit{Soft Skills/Character: After} following the learning process of the Plant Physiology Ecology course, it is expected to produce students who believe and are devoted to Allah SWT, care for the environment, are honest, responsible, have noble character, are introspective, intelligent, skilled, sensitive and empathetic, critical, think rationally, dynamically, get along and understand the actual problems that occur in plants.

\textbf{BIO2.62.5009 Marine Biology 2 Credits}

This course will explain the biology of organisms that live in the sea and the coast, especially in its aspect as a resource. Marine environmental factors that determine the mentality and population density of these organisms are specifically those that live in Indonesia. The impact of environmental pollution on marine resources is also a topic to be discussed. This lesson is followed by practicum in coastal and shallow sea areas, practicum includes measurement of physical and chemical factors, how to measure population density and community analysis.

\textbf{BIO2.62.6001 Cell Genetics 2 Credits}

Introduction (Structure and Function of Chromosomes; Variations in Number of Chromosomes); Variations in the number of chromosomes; Changes in chromosomal structure; Gene mutations; Induced genetic changes; DNA repair; Cytoplasmic Inheritance.

\textbf{BIO2.62.6002 Phytopathology 2 Credits}

Able to master the symptoms and signs of disease in plants 2. Able to master the causes of disease in plants 3. Able to master virulence factors that cause disease in plants 4. Able to master factors that influence disease development 5. Able to master methods of controlling disease in plants \textit{Soft Skills/Character:} Able to be a person who is steady, has character, has noble character, is wise, authoritative, and can be an example.

\textbf{BIO2.62.6003 Weed Science 2 Credits}

Understanding weeds and their limits. Grouping of weeds based on habitat, life cycle, morphology. Weed reproductive organs. Quantitative loss and qualitative effect of weeds. Types of weed and plant interactions, Allelopathy. Mechanical weed control, technical culture, biological and chemical. Definition of weeds, classification, competition, allelopathy, development and propagation of weeds, the persistence of weeds in a field, aquatic weeds, plantations and rice fields. Mechanical, biological, clinical and integrated weed control and herbicide metabolism.

\textbf{BIO2.62.6004 Endocrinology 2 Credits}

Discuss in general about the working relationship, the applicable provisions and methods in the research of the hormone system, as well as the mechanism of action of hormones. Some glands such as the pituitary, thyroid and pancreas are discussed in detail.

\textbf{BIO2.62.6005 Mycology 2 Credits}

Students can know and understand the basic concepts of mycology which include classification of fungi, mushroom fruiting body shapes, ways of reproduction (sexual and asexual), reproductive organs, habitats and their importance in human life. Knowing the grouping of fungi based on the classification, namely \textit{Division Myxomycota, Division Eumycota, Division Mastigomycota, Division Zygomycota, Division Lichensophyta, Division Ascomycota and Division Basidiomycota}, and the role of mushrooms in industry and health. \textit{Soft skills/Character:} Able to recognize, understand and explain the basic concepts of Mycology as a science in biology which includes life, carry out effective communication in analyzing and knowing the division of fungi (fungi).

\textbf{BIO2.62.6006 Soil Microbiology 2 Credits}

This course discusses the concepts and processes of soil microbiology, microbial populations in the soil, the role of microbes in various processes in the soil such as soil formation, compost, humus, the process of decomposition of organic matter and pesticides as well as the role of soil microbes in various material cycles and soil fertility. It also discusses the role of soil microbes in causing disease in plants.

\textbf{BIO2.62.6007 Wetland Ecology 2 Credits}

Students are able to master science and technology related to the determination and function of a wetland and adapt their abilities to solve wetland problems. Students are able to identify.
forming wetlands that occur naturally through natural events or artificially by humans, students are able to make strategic decisions to raise wetlands for the conservation of flora and fauna in it.

**BIO2.62.6008 Microbial Physiology 2 Credits**
Microbial Physiology is an elective course that facilitates students to explore microbiology in order to prepare students who will conduct research in the field of microbiology. In this course, various physiological processes of microbes that act as biofermentors and biodegradable are discussed.

**BIO2.62.6009 Molecular Genetics 2 Credits**
This course discusses the molecular processes that occur in transcription for various cell responses to the signals it receives.

**BIO2.62.6010 Herpetology 2 Credits**

**BIO2.62.6011 Ornithology 2 Credits**
Classification, structure, behavior and distribution of birds (zoogeography) wild type, migratory and endemic. Emphasis is placed on the birds found in Indonesia, especially those related to human life.

**BIO2.62.6012 Ethnobotany 2 Credits**
This course discusses various uses of plants that characterize certain ethnic/ racial traits in various parts of the world. Plants as traditional medicine or used as certain tools.

**BIO2.62.6013 Population Genetics 2 Credits**

**BIO2.62.6014 Teratology 2 Credits**
Theories and concepts of developmental disorders that occur starting from the level of organogenesis, which are influenced by hormones and induction of differentiation and grow with developmental disorders caused by various teratogenic compounds.

**BIO2.62.6015 Physiology of Plant Stress 2 Credits**
This course discusses the physiological response of plants to the stress they receive, either naturally or artificially.

**BIO2.62.6016 Immunology 2 Credits**
This course discusses how an immunity is formed as a natural or artificial response to certain diseases.
BIO2.62.6017 Hydroponics 2 Credits
This course discusses how a plant can grow in water media enriched with micro and macro nutrients, as well as the accompanying physiological aspects.

BIO2.62.6018 Natural Resources Conservation 2 Credits
This course discusses various efforts for the conservation of various natural resources so that they can be used sustainably from an ecological aspect.

BIO2.62.6019 Palinology 2 Credits
This course discusses various pollen structures as adaptations of plants to natural reproduction strategies.

BIO2.62.6020 Microbial Genetics 2 Credits
This course discusses gene structure and inheritance patterns in microbes.

BIO2.62.7001 Industrial Microbiology 2 Credits
This course provides insight into industrial processes that are supported by physiological activities of microbes as fermenters to improve product quality.

BIO2.62.7002 Microbiology of Foodstuffs 2 Credits
Students are able to understand the relationship between microbes and food in realizing healthy food. - Students are able to carry out scientific activities related to microbes that play a role in producing healthy food. - Students are able to identify the types of microbes that play a role in food ingredients. - Students are able to apply the limits of food sanitation treatment in realizing healthy and quality food. Students understand the basic concepts of food microbiology, and understand the relationship between microbes and food in realizing quality food products. Soft skills/Character: Able to be a solid person, have a noble character, be wise, and dignified and be a role model.

BIO2.62.7003 Environmental Toxicology 2 Credits
This course is able to use and master for analysis to determine the impact of toxicology from the tissue level to the environmental level, Able to design and determine a research on LC50 from a natural and synthetic pollution able to utilize science and technology in the field of Toxicology starting from analyzing the impact of cellular toxins to the level of organism.

BIO2.62.7004 Animal Tissue Culture 2 Credits
This course discusses the history and culture of the development of animal tissue culture including embryonic stem cells/stem cell culture and Adult Stem Cells/Adult Cell Culture. Lectures and practicums are carried out so that students have the knowledge and skills to prepare for the Laboratory and have the skills and initial/mediational culture and sub-cultures (cell lineage).

BIO2.62.7005 Bioethics 2 Credits
The learning outcomes in this course are: Able to master and apply ethics in the field of biology including animal welfare treatment, especially test animals in the laboratory, ethics for handling biological waste, environmental ethics and scientific ethics in the field of biology.

BIO2.62.7006 Parasitology 2 Credits
Students can know and understand the basic concepts of parasitology which include life, definition and distribution of parasites, as well as the principles of parasitology. Parasite relationship with host (host) and their interplay, understanding parasites, parasitism, parasitic animals, vectors, hosts, and their relationship to humans, as well as their prevention and treatment. Soft skills/Character: Able to recognize and understand parasitology which includes life, carry out effective communication in analyzing and knowing the distribution of parasites, as well as the principles of parasitology. Parasite relationship with host (host) and their interplay, and their relationship to humans, as well as their prevention and treatment.

BIO2.62.7007 Entomology 2 Credits
This course discusses entomology in general; basic concepts of entomology in biology and their importance; insect phylogenetic relationship.
with other groups in the phylum Arthropod; structure and function of external organs; growth and development of insects; insect adaptation and diversity; classification, nomenclature and characteristics of insect life; insect collection and preservation techniques

**BIO2.62.7008 Mammalogy 2 Credits**
Discusses the taxonomic principles of mammals, morphology, structure and their relationship to each other. Then what is the function of its existence in nature, its ecology, the form of adaptation and the rules so that it survives in nature?

**BIO2.62.7009 Plant Metabolism 2 Credits**
Students are able to utilize science and technology in the field of plant physiology ecology and are able to adapt to situations encountered in solving problems. *Soft Skills/character*: After following the learning process of the Plant Physiology Ecology course, it is expected to produce students who believe and are devoted to Allah SWT, care for the environment, are honest, responsible, have noble character, are introspective, intelligent, skilled, sensitive and empathetic, critical, think rationally, dynamically, get along and understand the actual problems that occur in plants

**BIO2.62.7010 Plant Specimen Collection and Management 2 Credits**
Introduction, collection of plants, purpose of collection, exportation, expedition to prepare botanical expeditions, processing of collections into herbarium specimens, herbarium, management of specimens in herbarium, herbarium study techniques

**BIO2.62.7011 Medical Microbiology 2 Credits**
This course discusses the role of microorganisms for human health and disease. The scope of microbes that will be discussed is in the realm of bacteriology and virology. This course will explain the introduction to medical microbiology, the principles of Koch's postulates, pathogenesis, virulent factors and the epidemiology of bacterial and viral infections, the body's defense mechanisms against infection, the principles of antimicrobial therapy, infection diagnosis techniques, vaccine development techniques, and antimicrobial compound development techniques.

**BIO2.62.7012 Human Genetics 2 Credits**
Human Genetics is an elective course that discusses the application of classical and molecular genetic studies in humans. This course discusses about the development of human genetics, basic concepts about genes and chromosomes, genes, inheritance and human allelic disorder, human chromosomal abnormalities, blood types, population genetics, genetics and cancer, human genome projects, diagnosis of human genetic diseases, applications of genetic engineering, in human genetics, and genetic counseling

**BIO2.62.7013 Plant Disease Control 2 Credits**
This course discusses various ways of transmitting plant diseases by bacteria, viruses with vector intermediaries and natural handling efforts

**BIO2.62.7014 Seed Structure 2 Credits**
This course discusses the diversity of seed structures as a dispersal strategy for seed plants

**BIO2.62.7015 Food and Nutrition 2 Credits**
This course covers the relationship of nutrition to food and health, the function of food, grouping food and its nutritional content, food processing and its impact on health, calculating energy needs, determining nutritional status, nutritional problems in Indonesia from social and cultural aspects, and promoting balanced nutrition and designing research for nutrition and food development

**BIO2.62.8001 Animal Specimen Collection and Management 2 Credits**
This course discusses how to collect invertebrates and vertebrates in the field and their preservation techniques. Collected specimens are documented and archived in a catalog book

**BIO2.62.8002 Plant Population Ecology 2 Credits**
This course discusses the dynamics of plant populations in terms of ecology.

**BIO2.62.8003 Metabolism of Nutrients 2 Credits**
This lecture is about the use of substances or nutrients that enter the body and undergo mechanical and chemical changes so that they can be used by the body as nutrients for growth, development and defense.
Biology Education Study Program (S2)

1) Vision
To become a superior study program producing a master’s degree in Biology Education that is professional, has character and is able to compete in the era of globalization based on faith and piety in 2020.

2) Mission
a. Organizing superior education in the field of biology education professionally based on faith and piety.
b. Organizing excellent research in the field of biology education with character based on faith and piety.
c. Organizing excellent community service in the field of science and technology based on faith and piety.
d. Produce master graduates in the field of biology education who are professional, characterized and based on faith and piety.

3) Purpose
a. Develop a professional biology education based on faith and piety through superior research.
b. Apply and disseminate biology education to improve people’s welfare.
c. Preparing students to become members of the professional community in biology education based on faith and piety.
d. To produce masters of biology education graduates who are professional, have character, have faith, are pious, and are able to solve social problems.

4) Graduate Competencies
a) Main Competencies
   (1) Lecturer:
   (a) Develop concepts and theories to solve problems in biology education and develop the potential of individuals, groups, organizations, and communities
   (b) Able to work together and have high social sensitivity and concern for society and the environment
   (c) Able to produce actual research and get national or international recognition
   (d) Uphold law enforcement and have the spirit to put the interests of the nation and the wider community first.

   (2) Researcher in Biology Education Sector:
   (a) Develop knowledge and methodologies in the field of biology education through research to produce innovative and tested works
   (b) Using biological sciences and biology education through an inter- or multidisciplinary approach to solve biology learning problems
   (c) Manage research whose results have the potential to be applied in solving problems in biology learning through an inter- or multidisciplinary approach and gain recognition in the form of scientific publications in accredited scientific journals both nationally and internationally

   (3) Teacher:
   (a) Develop concepts and theories to be applied in biology learning and develop the potential of individuals, groups, organizations, and communities
   (b) Able to work together and have high social sensitivity and concern for society and the environment
   (c) Able to produce actual research and get national recognition
   (d) Uphold law enforcement and have the spirit to put the interests of the nation and society at large

   (4) Widyaiswara:
   (a) Develop concepts and theories to be applied in biology learning and develop the potential of individuals, groups, organizations, and communities
   (b) Able to work together and have high social sensitivity and concern for society and the environment
   (c) Uphold law enforcement and have the spirit to put the interests of the nation and society at large
   (d) Manage research whose results have the potential to be applied in solving problems in the field of biology education through an inter- or multidisciplinary approach and gain recognition in the form of scientific publications in accredited scientific journals both nationally and internationally

   (5) Biology Education Consultant:
   (a) Develop knowledge and methodologies in the field of biology education through research to produce innovative and tested works
(b) Using biology education disciplines through inter- or multidisciplinary approaches to solve biology learning problems

(c) Managing research whose results have the potential to be applied in solving human problems by using the discipline of psychology through an inter or multidisciplinary approach and gaining recognition in the form of scientific publications in accredited scientific journals both nationally and internationally

b) Special Competencies

(1) Lecturer:
Delivering concepts and theories of education and biological sciences in the process of teaching and scientific development

(2) Researcher in Biology Education Sector:
(a) Mastering the concepts and theories of education and biological science
(b) Able to study problems and their solutions in the context of biology education

(3) Teacher:
Able to link biological science concepts with character values in learning and apply various strategies in the learning process and scientific development

(4) Widyaiswara:
(a) Conveying the concepts and theories of education and biological sciences in the process of teaching and scientific development
(b) Able to relate the concept of biological science with character values in the teaching and scientific development process

5). Course Structure

Major : Biology
Study program : Biology Education (S2)

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>13</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>14</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>16</td>
</tr>
</tbody>
</table>

2). Ma ta Study Program Compulsory Tuition

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>13</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>14</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

3). Study Program Elective Courses

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

2018 FMIPA Academic Manual

160
Synopsis

FMA2.80.2301 Curriculum Development 2 Credits
Many things related to the curriculum are generic in nature, which applies to all fields of study, levels, pathways and types of education. Therefore, this course is designed to provide basic knowledge about curriculum that applies to all fields of study, levels and "settings" education. This consideration is based on the assumption that postgraduate students, especially in the field of education, need to master in general and thoroughly various conceptions of the curriculum, basics and principles development, and implication to design curriculum, implementation of the lectures from the various available alternatives.

FMA2.80.3301 Learning Design 2 Credits
Discusses the basic concepts of instructional system design, learning needs, analysis instructional, formulation of instructional objectives, characteristics of students environment, learning activities, resources and lessons, management learning and the existence of evaluation in terms of learning design.

BIO1.82.1001 Animal Cytotaxonomy 2 Credits
This course discusses the principle of classifying invertebrates and vertebrates morphologically and molecularly, and making the correct order of animal taxa based on existing manuals.

BIO1.82.1002 Plant Cytotaxonomy 2 Credits
This course discusses the principles of morphological and molecular grouping of lower and higher plants, as well as making the correct order of plant taxa.

BIO1.82.1003 Ecology and environment 2 Credits
This course discusses the interaction of living things with the biotic and abiotic environment.

BIO1.82.1004 Research Methodology for Advanced Education 3 Credits
This course discusses tips for formulating research ideas, making research designs and communicating ideas effectively.

BIO1.82.1005 Education Statistics 2 Credits
This course discusses how to process data and present research data.

BIO1.82.1006 Biology Learning Methodology 3 Credits
This course discusses the basic skills of teachers, teacher and lecturer competencies, various approaches, methods and learning models.

BIO1.82.2002 Physiology of Higher Plants 2 Credits
This course discusses the structure, function and physiological processes of higher plants and the physical and chemical environmental factors that support plant physiology processes.

BIO1.82.2003 Animal Behavioral Physiology 2 Credits
This course discusses cell communication and animal responses to intracellular and extracellular signals.

BIO1.82.2004 Genetics and Reproduction 2 Credits
This course discusses classical genetics, molecular genetics, gene mutations, chromosomal mutations, cancer and inheritance to the next generation through sexual and asexual reproduction processes.

BIO1.82.2005 Cell and Molecular Biology 2 Credits
This course discusses the structure, function and molecular mechanisms of cells.

BIO1.82.2006 Evaluation of Biology Learning 3 Credits
This course discusses the concept of evaluation, assessment in the cognitive, affective and psychomotor domains. Assessment according to Bloom's taxonomy, assessment according to PISA and TIMSS standards.

BIO1.82.3001 Applied Microbiology 2 Credits
This course discusses the basic concepts of microbiology and the application of microbes in life.

BIO1.82.3002 Applied Biotechnology 2 Credits
This course discusses conventional and modern biotechnology and the application of biotechnology on a small scale and large scale.

BIO1.82.3003 Philosophy of Science 2 Credits
This course discusses the nature of thinking ontology, epistemology and axiology; application of the concept of philosophy of science in thinking
science; and the application of the philosophy of science in everyday life.

3. Physics Department

a. Vision

Realizing the Superior Department in Education and Physical Sciences at the National Level in 2020 based on Faith and Taqwa. The mission of the Department of Physics, FMIPA UNP, is to:
1) Implementing Excellent Education in the Field of Education and Physics Based on Faith and Taqwa
2) Conducting Excellent Research in Education and Physical Sciences.
3) Implement Excellent Community Service in the Field of Education and Physical Science.
4) Improving the Excellent Management of the Department
5) Increase Local, National and International Cooperation

b. Destination

The objectives of the Physics Department of the Faculty of Mathematics and Natural Sciences UNP are:
Prepare graduates who are reliable, qualified, have competitive and comparative advantages at the local, national and regional levels.

c. Study program

Based on the letter of the Director General of Higher Education No. 1499/D/T/1996 regarding the expansion of the mandate, IKIP Padang starts the academic year 1997/1998 in addition to its main task of fostering educational programs, gradually also fostering non-educational programs. Starting on August 4, 1999 IKIP Padang changed its name to Padang State University. Since then the Department of Physics Education has changed to the Department of Physics by fostering two study programs, namely the Physics Education Study Program and the Physics Education Study Program.

Physics Study Program.

d. Study Load

To complete undergraduate education in the Department of Physics, students are required to have passed courses of at least 149 credits. For the Physics Education Study Program, general courses are 11 credits, field of expertise courses are 92 credits, basic education courses are 12 credits, learning process skills courses are 18 credits, and education development courses are 16 credits. The Physics Study Program consists of 11 credits of general courses, 78 credits of expertise, 42 credits of creative skills, and 18 credits of creative behavior.
1. Study Program: Physics Education (S1)

1) Vision
In 2020, a Bachelor Study Program that excels in the field of Physics education at the national level based on faith and piety

2) Mission
a) Improving the quality of education and learning-oriented on technological excellence and religious character (M1)
b) Increase productivity in research activities oriented to technological developments and character values (M2)
c) Increase productivity in Community Service activities that are oriented towards the development of science and technology and character development in the community (M3)
d) Improving the quality of study program governance that is effective and efficient through optimizing the use of information technology (M4)
e) Increase cooperation with related institutions, both local, national and international (M5)

3) Purpose
The realization of the excellence of the study program in terms of quality and the relevance of the program to the achievement of the Tridharma of Higher Education, which produces graduates of Physics Education who are professional, have the ability in science and technology and superior learning innovation, and are able to compete at local, national and regional levels based on faith and piety”

These objectives can be broken down as follows:

a) Related to M1: The implementation of education and learning that is oriented towards technological excellence and religious character.
b) Related to M2: Increased productivity in research activities oriented to technological developments and character values.
c) Related to M3: Increased productivity in Community Service activities that are oriented towards the development of science and technology and character development in the community.
d) Related to M4: Increasing the quality of study program management that is effective and efficient through optimizing the use of information technology.
e) Related to M5: Increased cooperation with relevant agencies, both local, national and international.

4) Learning Outcomes of Graduates of the Attitude Study Program
a. fear God Almighty and be able to show a religious attitude;
b. upholding human values in carrying out tasks based on religion, morals, and ethics;
c. contribute to improving the quality of life in society, state, and the progress of civilization based on Pancasila;
d. act as citizens who are proud and love their homeland, have nationalism and a sense of responsibility to the state and nation;
e. respect the diversity of cultures, views, religions, and beliefs, as well as the opinions or original findings of others;
f. cooperate and have social sensitivity and concern for society and the environment;
g. obey the law and discipline in the life of society and the state;
h. internalize academic values, norms, and ethics;
i. demonstrate an attitude of responsibility for work in the field of expertise independently;
j. internalize the spirit of independence, struggle, and entrepreneurship; and
k. have sincerity, commitment, sincerity to develop the attitudes, values, and abilities of students based on the values of local wisdom and noble character and have the motivation to act for the benefit of students and society in general

Knowledge
In the substance of the scientific field
a. the theoretical concepts of classical and modern (quantum) physics in general;
b. general concepts, principles, and applications of mathematics, computation, and instrumentation physics;
c. complete operational knowledge of functions, how to operate general and specific physics instrumentation for the learning process;
d. principles, characteristics, functions, and applications of software in the field of physics.

In educational substance
a. physics education research methodology;
b. laboratory management for physics learning
c. the theoretical concept of education, the development of students (physical, intellectual, socio-emotional, moral, spiritual, and socio-cultural background aspects) in general;
d. theoretical concepts, principles, methods, and techniques:
1) Physics Learning (Physics teaching pedagogy) in depth which includes: planning, presentation, and management of learning (curriculum, learning resources, media, and learning models), as well as assessment and evaluation of Physics learning processes and outcomes;
2) Development of Physics learning media;
3) Development of Physics laboratory equipment for schools
e. general concepts and management principles (planning, operation, supervision, evaluation, and improvement) of school physics laboratories laboratorium
f. general concepts, principles, and techniques for mentoring students
g. general concepts and methods of educational research in the field of Physics

Special skill
In the substance of the scientific field:
a. able to make physics learning tools independently according to the needs of users, both schools and the general public by using scientific principles and principles of instructional design;
b. able to make high school physics learning tools through subject matter analysis (pedagogical content knowledge) independently in accordance with the applicable curriculum, principles of instructional design, scientific approach, utilizing science and technology, and the surrounding environment;
c. able to analyze problems, find sources of problems, and solve physics instrumentation problems in the physics learning process and physics laboratory management problems in accordance with the rules of physics science.
d. Able to analyze and propose various alternative solutions to physics learning media problems and physics laboratory management problems, as well as conclude them for making the right decisions
e. able to improve the quality, effectiveness, and efficiency of physics learning devices independently by using scientific principles and principles of innovation;
f. able to promote the importance of learning physics for students, parents, and the general public by using the media

c. able to carry out assessment and evaluation activities of learning processes and outcomes that are valid, reliable, objective, and practical (according to the characteristics of Physics learning) which include:
1) determination of aspects of the learning process and outcomes that are important to be assessed and evaluated;
2) determination of procedures in accordance with the objectives of the assessment and evaluation;
3) development of assessment and evaluation techniques and instruments;
4) implementation of evaluation according to the specified procedures, techniques, and instruments instrumen
5) implementation of the assessment moderation process;
6) analysis of the results of the assessment process and learning outcomes for various purposes;
7) administration of continuous assessment of learning processes and outcomes;
d. able to perform reflective analysis of learning (through observation and feedback from students, parents of students and colleagues) to improve the quality of learning;
e. able to conduct classroom action research (action research) with a quantitative and/or qualitative approach to solve physics learning problems and report research results in the form of scientific articles;
f. able to provide assistance to students by considering socio-cultural aspects, as well as collaborating with related parties (parents and friends of students, the surrounding community, and peer teachers); and conventional or up-to-date communication that is effective and relevant to the target.

In educational substance:
a. able to carry out high school physics learning with scientific approach in accordance with the characteristics of the material and the characteristics of students in order to be able to develop the ability to think and behave scientifically;
b. able to plan and manage resources in classroom administration and use of laboratories for learning Physics
General Skills
a. able to apply logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology that pays attention to and applies humanities values in accordance with their field of expertise;
b. able to demonstrate independent, quality, and measurable performance;
c. able to examine the implications of the development or implementation of science and technology that pays attention to and applies humanities values according to their expertise based on scientific principles, procedures and ethics in order to produce solutions, ideas, designs or art criticism;
d. able to compile a scientific description of the results of the studies mentioned above in the form of a thesis or final project report, and upload it on the university's website;
e. able to make appropriate decisions in the context of solving problems in their area of expertise, based on the results of information and data analysis;
f. able to maintain and develop a network with supervisors, colleagues, peers both inside and outside the institution;
g. able to be responsible for the achievement of group work results and to supervise and evaluate the completion of the work assigned to the workers under their responsibility;
h. able to carry out the process of self-evaluation of the working group under their responsibility, and able to manage learning independently; and

i. able to document, store, secure, and rediscover data to ensure validity and prevent plagiarism.

5). Course Structure
Major : Physics
Study program : Physics Education (S1)

### 1. University Compulsory Tuition

#### A. Required

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UNP1.60.1401</td>
<td>Religious education</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>UNP1.60.1402</td>
<td>Pancasila Education</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

### 2. University Elective Courses

**A. Choose 2 of 18**

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UNP2.60.1401</td>
<td>Basic Natural Science</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>UNP2.60.1402</td>
<td>Basic Socio-Cultural Sciences</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>UNP2.60.2101</td>
<td>Fitness Education Physical</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>UNP2.60.2102</td>
<td>Japanese language</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>UNP2.60.2103</td>
<td>Multicultural Education</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>UNP2.60.2401</td>
<td>History of the Indonesian Nation's Struggle</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>UNP2.60.2402</td>
<td>Disaster Management</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>UNP2.60.3401</td>
<td>Natural Culture MinangKabau</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>UNP2.60.3402</td>
<td>Information and communication technology</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

**Number of Credits**

- 18 Credits
### 3). MA ta Faculty Compulsory Lecture

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>T</th>
<th>PL</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Required</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>FMA1.60.1302</td>
<td>Calculus</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>FMA1.60.1303</td>
<td>General Physics</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>FMA1.60.2102</td>
<td>General biology</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>FMA1.60.2103</td>
<td>General Chemistry</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Number of Credits</strong></td>
<td>16</td>
<td>12</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>Choose 91 of 91 credits of compulsory study program</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>FIS1.61.2301</td>
<td>Basic Physics</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Number of Credits</strong></td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

### 4). Study Program Compulsory Courses

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>T</th>
<th>PL</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Choose 91 of 91 credits of compulsory study program</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>FIS1.61.1301</td>
<td>Physics Education Statistics</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>FIS1.61.1302</td>
<td>Electronic and Measurement Instruments</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>FIS1.61.2302</td>
<td>Math Physics 1</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>FIS1.61.3201</td>
<td>Basic Electronics Physics</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>FIS1.61.3302</td>
<td>Learning Strategy 1</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>FIS1.61.3303</td>
<td>Mechanics</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>FIS1.61.3304</td>
<td>Middle School Physics Curriculum</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>FIS1.61.3305</td>
<td>Learning Evaluation Physics</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>FIS1.61.3306</td>
<td>Math Physics 2</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>FIS1.61.4201</td>
<td>High School/MA Physics Analysis Class X</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>FIS1.61.4302</td>
<td>Basic Electronics 2</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>FIS1.61.4303</td>
<td>Algorithms and Computer Programming</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>13</td>
<td>FIS1.61.4304</td>
<td>Electric and Magnet</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>14</td>
<td>FIS1.61.4305</td>
<td>Physics Learning Media</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Number of Credits</strong></td>
<td>51</td>
<td>49</td>
<td>11</td>
<td>0</td>
</tr>
</tbody>
</table>

### 5). Study Program Elective Courses

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>T</th>
<th>PL</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Choose 8 credits from 30 credits</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>FIS2.61.5301</td>
<td>Earth and Space Science</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>FIS2.61.5302</td>
<td>Philosophy of Science</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>FIS2.61.5401</td>
<td>History of Physics</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>FIS2.61.6201</td>
<td>Photography</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>FIS2.61.6302</td>
<td>Environmental Physics</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

---

2018 FMIPA Academic Manual
### Courses

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>T</th>
<th>PL</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>FIS2.61.6303</td>
<td>Applied physics</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>FIS2.61.7101</td>
<td>Electronic Equipment System</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>FIS2.61.7301</td>
<td>Application of Physics-Based</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>FIS2.61.7302</td>
<td>TTG Sensor Technology</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>FIS2.61.7303</td>
<td>Physics Learning Seminar</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>FIS2.61.7401</td>
<td>Renewable energy</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>FIS2.61.8201</td>
<td>Capita Selecta Physics Learning</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>FIS2.61.8301</td>
<td>Health Physics</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>FIS2.61.8302</td>
<td>Application Software for Science</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>FIS2.61.8303</td>
<td>Capita Selecta Physics</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Number of Credits**: 30 19 6 5

### Pancasila Education in Higher Education
Pancasila education in higher education is aimed at developing the value of Pancasila in students, the basis of the state of the Republic of Indonesia, as a state ideology, as an ethical system, and Pancasila as the basis for the value of developing science. Thinking and implementing Pancasila in dealing with current actual problems, such as human rights, racial and economic problems, and the problem of radicalism that must be solved in accordance with the values of Pancasila.

**UNP1.60.1403 Citizenship Education 2 Credits**

This course contains the nature of civic education in developing full undergraduate or professional abilities; the essence and urgency of national identity as one of the determinants of nation building and character, the urgency of national integrity and national unity; the constitutional values and norms of the 1945 Constitution of the Republic of Indonesia and the constitutional provisions of the legislation under the Constitution; harmony of obligations and rights of the state and citizens in a democracy that is based on people's sovereignty and deliberation for consensus; the nature, instrumentation, and practice of Indonesian democracy based on Pancasila and the 1945 Constitution of the Republic of Indonesia; the historical dynamics of constitutional, sociopolitical, cultural, and contemporary contexts of sovereign law enforcement; the historical dynamics and the urgency of the insight into the archipelago as a collective conception and view of the Indonesian nationality in the context of world relations; national urgency and challenges and defend the country for Indonesia in building a collective commitment to nationality.

**UNP1.60.1402 Pancasila Education 2 Credits**

This course contains the meaning of urgency and the reasons for its need.

2018 FMIPA Academic Manual
area of expertise.

UNP1.61.1201 Fundamentals of Education 2 Credits
Provide insight into human nature, the nature and importance of education, the foundations and principles of education, thoughts about education

UNP1.61.2101 Educational Psychology 2 Credits
This course examines/discusses the basic concepts of educational psychology, growth, student development, intelligence, talent, creativity, motivation, memory, individual differences and learning theories.

UNP1.61.2102 Administration and Education Supervision 2 Credits
Educational Administration and Supervision courses are courses that provide insight, basic concepts and processes as well as the scope of Educational Administration and Supervision and apply them in professional school management.

UNP1.61.2103 Philosophy of Education 2 Credits
The Philosophy of Education course examines the nature of educational philosophy and its relation to religion, education and culture. Human nature as an educator (inner creative thinking). Streams of Educational Philosophy and their implementation and implications in the administration of education.

UNP1.60.3101 Entrepreneurship 3 Credits
This course contains knowledge, attitudes and skills based on creative and innovative thinking regarding the basic principles of entrepreneurship, entrepreneurial development models, entrepreneurial strategies, business ethics in entrepreneurship, opportunity analysis, business feasibility studies and business management (marketing, production, finance), resources, business legality, technology and information

UNP1.61.3102 Introduction to School Field I 1 Credit S
Introduction to School Field I (PLP I) is the first stage in the Introduction to School Fields for the Bachelor of Education Program, which is carried out in the third or fourth semester. As a first stage, after PLP I, it will be continued with Introduction to School Field II (PLP II) in the higher semester.

UNP1.61.4201 Guidance and Counseling 2 Credits
Guidance and Counseling is a compulsory university education course that provides insight and understanding of the basic concepts of BK, including: understanding, background, objectives, functions, principles and code of conduct of BK, BK development fields, types of BK services, and BK protection activities as well as BK implementation operations in curriculum implementation 2013. In addition, it also discusses the role of the Principal, Deputy Principal, Subject Teachers, Class homeroom teachers, BK teachers or counselors and other personnel as well as BK Supervisors in BK services in schools.

UNP1.61.6402 Introduction to School Field II 3 Credits
Introduction to School Fields II (PLP II) is the second stage in the Introduction to School Fields for the Undergraduate Education Program which is carried out in the sixth or seventh semester. As an advanced stage of PLP I, PLP II is intended to strengthen academic competence in education and fields of study through various forms of activities in schools.

UNP1.60.7401 Real Work Lecture (KKN) 2 Credits
Real Work Lecture (KKN) is a field activity for students who are taking the final part of the S-1/D4/Applied Bachelor education program. This program is actually mandatory for all students, because the university believes that this program is able to encourage student empathy, and can contribute to solving problems that exist in society. Community service activities are a tangible form of the university's contribution to the community, industry, local government and community groups who want to be economically and socially independent. This KKN program requires Field Supervisors (DPL) and students to play an active role in knowing the existing problems, even before they plunge for 1 to 2.5 months in the midst of the community. Concept “working with community” has replaced concept “working for the community”;

UNP2.60.1401 Basic Natural Sciences 2 Credits S
This course contains the nature and scope of the human mind and its development, the development of science, the earth and the universe
the diversity of living things and their distribution, living things in nature ecosystems, natural resources and the environment, the benefits and impacts of science and technology on social life, the history of human civilization and technological developments, some important technological developments, and environmental issues

UNP2.60.1402 Basic Socio-Cultural Sciences 2 Credits
This course contains: Basic concepts in social and cultural sciences to study Indonesian society and changes in Indonesian society and culture. The subjects are humans and human culture as individuals and human social beings, moral values and human law, human diversity and equality, science technology and human arts and the environment.

UNP2.60.2101 Physical Fitness Education 2 Credits
This course applies the effects and benefits of various movement activities for physical fitness and health through various games, competitions, and sports exercises and abilities. Analyze importance activity physical for maintain and develop the body's physiological functions and health and can be applied throughout life.

UNP2.60.2102 Japanese 2 Credits
Japanese language courses equip students with knowledge about Japanese language practice so that students have the ability to read and communicate using Japanese.

UNP2.60.2103 Multicultural Education 2 Credits
This multicultural education course contains the concept of multicultural education: the urgency of multicultural education in a diverse Indonesian society, building an inclusive diversity paradigm through educational institutions. prospects and constraints of multicultural implementation, implementation of multicultural education in Indonesia, as well as character building of students through the application of multicultural ideology in the field of education.

UNP2.60.2401 History of the Struggle of the Indonesian Nation 2 Credits
The National Struggle History course discusses the meaning and history of the nation's struggle, imperialism and colonialism, struggle

UNP2.60.2402 Disaster Management 2 Credits
This course refers to Law No. 24 of 2007 on Disaster Management (Disaster Management) which includes the introduction of facts or evidence of disaster events, introduction of the concept of disaster, types of disasters, characteristics of disasters, natural disasters, non-natural disasters, disasters social, vulnerable, disaster / hazard (hazard), potential hazard, vulnerability, (vulnerability), capacity, principle of risk reduction (risk), prevention, mitigation, preparedness, disaster prediction, disaster impact, disaster response procedures and emergency response, analysis of rehabilitation and reconstruction needs.

UNP2.60.3401 MinangKabau Natural Culture 2 Credits
This course contains material on Minangkabau customs, both objective and subjective. Through the study of objective and subjective customs, students are expected to be able to understand Minangkabau human identity and be able to find the values of progress contained in adat that are relevant to the challenges of 21st century competence, namely multiculturalism, cooperation, problem solving and so on.

UNP2.60.3402 Information and Communication Technology 2 Credits
This course learns about information and communication technology that can make daily work easier. Understanding usage “Office Applications” software, Internet Technology, Device usage learning animation development software, technology development and application use in education and being able to recognize internet-based business.

FMA1.60.1302 Calculus 4 Credits
This course discusses the real number system, equations and inequalities, absolute values and absolute inequalities, coordinate systems and simple graphs, functions, limits and continuity, derivatives, related rates, graphs, and integrals.
FMA1.60.1303 General Physics 4 Credit Points
This course discusses quantities and units, particle kinematics, particle dynamics, work and energy, linear momentum, angular momentum and rigid bodies, static fluids, dynamic fluids, concepts of temperature and heat, and the laws of thermodynamics.

FMA1.60.2102 General Biology 4 Credit Points
This course discusses the knowledge of living things and scientific methods, cells as the basis of life, metabolism, structure and organization of plant and animal bodies, biodiversity, structure, functions and processes in human organ systems, ecology, genetics and evolution and biotechnology.

FMA1.60.2103 General Chemistry 4 Credit Points
This course discusses Stoichiometry, Chemical Energetics, Atomic Structure, Periodic System of Elements, Chemical Bonds and Molecular Geometry, Forms of Matter and Chemical Equilibrium.

FIS1.61.1301 Physics Education Statistics 3 Credits
Physics education statistics course discusses basic concepts in statistics; center size, location size and deviation size; frequency distribution; opportunities; distribution of random variables; parameter estimation with normal distribution, inferential, t, c2 and f; hypothesis testing; analysis of variance; simple regression and correlation, non-parametric statistics, and statistical applications in solving physics education problems

FIS1.61.1302 Electronic and Measurement Instruments 3 Credits
Electronic instruments and measurement courses discuss the concepts of measurement and error, direct current meters, direct current bridges, alternating current meters, alternating current bridges, multimeters, oscilloscopes, electronic measuring instruments in Physics and Applications of Physics instruments in various fields.

FIS1.61.2301 Basic Physics 4 Credits
The basic physics course discusses the basic concepts of electricity, magnetism, vibration, waves, optics and modern physics.

FIS1.61.2302 Mathematics Physics 1 3 Credits

FIS1.61.3302 Basic Electronics 1 3 Credit Points
Basic electronics course 1 discusses the basic laws of electricity (Ohm's law, Joule, Kirchhof and others), basic circuits using passive components and active components including: voltage divider circuits, current dividers, equivalent circuits, charging and discharging capacitors, circuits passive signal processors, RLC circuits, semiconductor diodes, rectifier and waveforming circuits, bipolar transistors and transistors as amplifiers

FIS1.61.3303 Mechanics 3 Credit Points
This course discusses the relationship between dimensions of mechanics and variables (scalars and vectors) in various mechanics concepts. Two- and three- dimensional kinematics about position vectors, velocity and acceleration, differential and integral applications in mechanical systems with Cartesian, polar, cylindrical and spherical coordinates. Particle dynamics are described through Newton's laws of motion, positional, velocity and time functions, Kepler's laws of orbit, motion of the central force, gravity, gravitational potential, equipotential forces & surfaces, and explain the phenomena of motion under the influence of gravitational force and gravitational potential. Analysis of linear and angular momentum, impulse, work and energy, laws of conservation of energy and momentum. Rigid body mechanics is described in terms of linear and angular momentum, linear and angular velocity, torque,
principal moment of inertia and principal axis, perpendicular axis theorem, some properties of inertia tensor. In Lagrange and Hamilton mechanics, general coordinates, general forces, kinetic and potential energies, Lagrange and Hamilton equations for various motion systems are described. Train skills about mechanical insight with practical work in the laboratory directly or through IT (virtual and tracker).

**FIS1.61.3304 Middle School Physics Curriculum 3 Credits**
The high school physics curriculum course discusses the definition of curriculum, curriculum characteristics, curriculum components, types and models of curriculum development, the nature of the 2013 curriculum, graduate competency standards (SKL), content standards, process standards, classroom-based assessment and authentic assessment. character education, mapping skkd/ki-kd, integrated learning, designing semester and annual programs, syllabus, and determining the KKM for high school physics subjects.

**FIS1.61.3201 Physics Learning Strategy 3 Credits**
The physics learning strategy course discusses describing teacher educational insights, describing the characteristics of the 2013 curriculum, explaining the taxonomy of learning objectives in the cognitive, affective, and psychomotor domains, explaining the objectives and competency standards, discussing various learning theories that underlie learning strategies, discussing and applying learning theories and models, comparing and contrasting the learning models, and identifying the key elements in the learning models.

**FIS1.61.3305 Evaluation of Physics Learning 3 Credits**
The physics learning evaluation course discusses the comparison of assessments, measurements and tests; Forms, types and techniques of assessment; Assessment functions and criteria; Implementation steps Management of assessment results, Utilization and reporting of class assessment results, validity, reliability, measurement bias; Good judgment principles; Designing assessments and assessment rubrics and conducting case studies so as to be able to conduct an assessment of those implemented in the field.

**FIS1.61.3306 Mathematical Physics 2 3 Credits**
Mathematics physics course 2 discusses partial differentials: maximum-minimum value problems, boundary conditions problems, variable changes, leibniz’s rule. calculus of variations: Euler’s equation, Lagrange’s equation, special functions: gamma function, stirling approximation formula, beta function, error function. solution of differential equations with series: power series method, legendre function, probenius method, bessel function, hermite function, leguere polynomial. partial differential equations: application of the variable separation method to the laplace equation, wave equation, diffusion equation. complex variables: contour integrals, laurent series and remainder theorems, use of residual theorems on integrals. integral transformation: laplace transform, fourier transform.

**FIS1.61.4302 Basic Electronics 2 3 Credits**
Basic electronics course 2 discusses voltage amplifier circuits, buffer circuits, DC coupled amplifier circuits, transistor switch circuits and applications, multivibrator circuits with transistors and applications, operational amplifier circuits and applications.

**FIS1.61.4303 Algorithm and Computer Programming 3 Credits**
Algorithm and computer programming courses discuss the operating system of a number, programming algorithms in the form of flow diagrams, basic programming which includes the basics of the Pascal language, graph programming, and animation of the basic concepts of physics problems.

**FIS1.61.4304 Electricity and Magnetism 3 Credits**
The electric-magnetic course discusses the concepts of electrostatics, special techniques for calculating potential, electrostatic fields in materials, magnetostatics, magnetostatic fields in materials, electrodynamics, the law of conservation, and Maxwell’s equations and electromagnetic waves.

**FIS1.61.4201 Physics Analysis SMA/MA Class X 3 Credits**
The physics analysis course for SMA/MA Class X discusses the discussion of physics learning material for class X including: the nature of physics, scientific procedures, measurements, vectors, straight motion, parabolic motion, circular motion, Newton’s laws of motion and about gravity, work and energy, impulses and momentum, as well as harmonious vibrations, according to the characteristics of the material and students’ thinking process skills keterampilan.

**FIS1.61.4305 Physics Learning Media 3 Credits**
Physics learning media course discusses the meaning and importance of learning media, the role of media in learning, the benefits of media in learning, classification of learning media, selection criteria.
learning media, development of learning media, manufacture of simple learning aids, use and management of learning resources (laboratory, library and micro learning), concept of evaluation of learning media, ICT-based learning media, ICT-based learning media software: wordpress, jommla, moodle, etc., and strategies for using media in the physics learning process.

**FIS1.61.4306 Technology and Disaster Based Physics Learning 2 Credits**
The technology and disaster-based physics learning course discusses the application of physics learning based on real and virtual laboratory experiments, the use of ICT in physics learning, the use of video analysis and modeling software in physics learning, and the integration of disaster materials into physics learning.

**FIS1.61.5401 Thermodynamics 3 Credits**

**FIS1.61.5301 Wave and Optics 3 Credits**
Optical waves course discusses harmonic vibrations, one-, two- and three-dimensional mechanical waves, sound waves, electromagnetic waves, modulation, polarization, interference, diffraction, lasers and holography.

**FIS1.61.5101 Modern Physics 3 Credits**
Modern physics courses discuss introduction to modern physics, special relativity theory, quantum phenomena, atomic structure, quantum theory of the hydrogen atom, many-electron atoms, and molecules.

**FIS1.61.5201 Physics Analysis SMA/MA Class XI 3 Credits**
The Physics Analysis course for SMA/MA Class XI discusses the discussion of physics learning material for class XI including: balance and rotational dynamics, elastic properties of materials, static fluids, fluid dynamics, heat and its effects, kinetic theory of gases, thermodynamics, mechanical waves, traveling waves and stationary, sound and light waves, optical instruments, global warming phenomena and their effects according to the characteristics

**FIS1.61.5302 Physics Lesson Planning 3 Credits**
The lesson planning course discusses the application of PBM concepts in learning physics in high school. Various instructional developments in the field of physics studies. Preparation of crime scenes and lesson unit programs (RPP, Teaching Materials, LKS). Different types of teaching skills to be trained in micro learning.

**FIS1.61.5303 English for Physics Education 2 Credits**
English course for physics education discusses reviewing english grammar, reviewing active english conversation, writing physics lesson plan in english, writing a simple physics teaching material, teaching physics in english

**FIS1.61.6301 Statistical Physics 3 Credits**
Statistical physics course discusses probability theory, gas kinetic theory, velocity and rate distribution functions, transport phenomena, maxwellboltzmann statistics, bose-einstein statistics, and fermi-dirac statistics

**FIS1.61.6302 Quantum Physics 3 Credits**
Quantum physics course discusses wave-particle dualism, the basics of quantum physics, general properties of solving the one-dimensional Schrodinger equation, angular momentum, time-independent perturbation method and identical particle systems.

**FIS1.61.6303 Core Physics 3 Credits**
Core physics courses discuss the structure of the nucleus, nuclear properties, radioactivity, radiation detectors, alpha, beta and gamma decay; radiation protection; core reactions, core styles and models; fission, nuclear power plants, particle accelerators and elementary particles

**FIS1.61.6201 Physics Analysis SMA/MA Class XII 3 Credits**
The physics analysis course for SMA/MA Class XII discusses the discussion of physics learning material for class XII including: static electricity, direct current circuits, magnetic fields, electromagnetic induction, circuits
alternating current, electromagnetic radiation, special relativity theory, quantum concepts and phenomena, atomic nuclei, energy sources and digital technology, according to the material characteristics and thinking process skills of students

**FIS1.61.6305 Research Methodology and Publication 3 Credits**
The research methodology course discusses approaches in obtaining the truth of science and research, research methods and designs, research processes and steps, the role of statistics in research, scientific writing, preparation and presentation of mini proposals, scientific papers, techniques for writing scientific articles for journals.

**FIS1.61.6307 Micro Learning 2 Credits**
Micro learning courses discuss introduction, practice of opening and closing learning skills, practice of explaining skills, practice of basic and advanced questioning skills, practice of skills to provide reinforcement, practice of skills in conducting variations, practice of skills in managing classes and small groups, practice of skills in applying variations of learning methods, practice the skills of applying the learning model.

**FIS1.61.7201 Physics of Solids 3 Credit Points**
Solid matter physics course discusses X-ray diffraction methods, crystal bonds, lattice vibrations, heat capacity, free electron theory, energy band theory and semiconductor crystals.

**FIS1.61.8302 Thesis 6 Credits**
Submission of research proposal outlines to the head of study programs, acceptance of research proposal outlines, determination of supervisors 1 and 2, research proposal writing, research proposal seminars, research proposal refinement, research implementation in schools, research report preparation, thesis examination, research report improvement, and article writing for ejournal

**FIS2.61.5401 History of Physics 2 Credits**
The history of physics course discusses the characteristics of the historical period of physics and analyzes the development of physics in ancient times, before the renaissance in Europe, the development of classical physics, the development of several branches of physics in the 18th and 19th centuries, the development of physics in the industrial revolution and the development of modern physics.

**FIS2.61.5301 Earth and Space Science 2 Credits**
In general, knowledge of earth and space includes the lithosphere, hydrosphere, atmosphere and the basics of climatology and the composition of the solar system, stars, celestial spheres, the universe and flight into space, including the use of artificial satellites.

**FIS2.61.5302 Philosophy of Science 2 Credits**
Science philosophy course discusses the study of philosophy and natural sciences

**FIS2.61.6302 Environmental Physics 2 Credits**
Environmental physics course discusses the composition of the air, temperature, pressure, humidity and its influence on life, and then relates to weather elements and their measurements. Water on earth: evaporation, water flow, hydrological cycle and ocean currents. Earth with its structure and its relation to earthquakes. Soil structure and basic mineralogy. The sun and energy: the structure of the sun, the strength of the sun's rays, the absorption of energy and the energy cycle. Physical isolation: mechanical, vibration isolation sound, light. Pollution: air, water, soil. Problems with the use of electricity, electromagnetic waves and radioactive materials.

**FIS2.61.6201 Photography 2 Credits**
Photography course discusses the definition of photography, the use of photography, three steps in the photography process, making business card frames, basic theory and types of cameras based on their shots, five important components of a camera, how to use a camera, steps to take pictures and carry out shooting in a nature studio, film and paper developer and make it, fixer film and paper and make it, how to wash film and practice washing black and white film, how to print and enlarge photos with enlarger and practice, photographing in a mini studio using flash and umbrella light, panning, freezing, bluring, landscape, how to take photos in a mini studio, how to print passport photos, and basics – basics in photo editing
FIS2.61.6303 Applied Physics 2 Credits
Applied physics courses discuss the application of physics concepts in Industrial Physics, Medical Physics, Reactor Physics and Energy Physics, including Solid State Devices in Industrial Logic Circuits, Photoelectronics, Fiber Optic and Lasers, Power Supply, Inverters and Converters, Open Loop and Closed Loop Feedback System, Electronic Input Output Devices, DC and AC Motors. Physical aspects of muscles and their measurements, physical aspects of the lungs, cardiovascular and their measurements, signal propagation in nerve cells and their measurements, physical aspects of ear and hearing and their measurements, physical aspects of the eye and vision and their measurements, bioenergetics, interaction of radiation with matter, transfer processes energy, Energy deposition and radiation dose calculation, Some physical, chemical, biological processes related to radiation and its effects, to improve the quality of human life. The study of physical processes on appropriate technology in various types of needs of human life, increasing the ability and understanding of engineering equipment, performing maintenance / repairs on appropriate technological engineering problems that arise and being able to provide solutions to environmental problems with an appropriate technological intervention approach.

FIS2.61.7303 Physics Learning Seminar 2 Credits
The physics learning seminar course discusses techniques for making good presentation media. Good presentation technique. Physics learning seminar exercises: choosing physics education topics for papers, writing simple papers, making presentation media, conducting seminars with panel discussions.

FIS2.61.7401 Renewable Energy 2 Credits
The renewable energy course discusses describing energy sources that can be used to replace fossil fuels with little impact on the environment. Types of alternative energy (solar energy, water energy, biological energy, biomass energy), as well as studying alternative energy conversion systems and their utilization.

FIS2.61.7101 Electronic Equipment System 2 Credits
The electronic equipment system course discusses the electronic equipment system used in everyday life. Understand simple electronic circuits and repairs contained in television systems, computers and networks. Besides that, it also discusses semiconductor components in TV receivers, TV wave receiver methods, computer assembly, I/O systems and computer operating system installations.

FIS2.61.7301 Application of Sensor Technology 2 Credits
The application of sensor technology course discusses sensor systems in measuring physical quantities, knowing the types of sensors, working principles of sensors, sensor characteristics, the principle of converting mechanical quantities to electrical quantities on sensors, as well as their application and use in electronic systems.

FIS2.61.7302 Physics-Based TTG 2 Credits
Physics-based TTG course discusses the technology used

2018 FMIPA Academic Manual
The Capita Selecta Physics course discusses the introduction: background, objectives, expected results, subjects to be contested, the level of the Olympic selection, the mechanism for selecting participants for the science olympiad at district, provincial, national, and international levels. The quiz questions for the National Physics Olympiad for the National High School include: thermodynamics, mechanics, electricity and magnetism, astronomy, and modern physics. The national science olympiad questions for junior high schools include: quantities, units, and measurements; mechanics; vibrations and waves; optics; substance and heat; electricity and magnetism; and IPBA. Practical strategies in solving physics olympiad questions quickly and easily

2. Study Program: Physics (S1)

1) Vision
Realizing an excellent undergraduate study program in physics at the national level in 2020 based on faith and piety.

2) Mission
Based on the vision, the mission of the Physics Study Program is as follows:
a) Carry out superior education in the field of Physics based on faith and piety (M1).
b) Carry out excellent research in the field of physics (M2).
c) Carrying out Community Service who excels in the field of physics (M3)
d) Improving the governance of excellent study programs (M4).
e) Increasing Local, National and International (M5) cooperation.

3) Purpose
Based on the mission described above, the objectives of PSS Physics can be formulated as follows:
1. Improving the competence of students and graduates who are knowledgeable, skilled, professional based on faith and piety (related to M1)
2. Produce quality content, process and assessment of physics learning based on faith and piety (related to M1)
3. Improving the quality of lecturers and education staff on an ongoing basis (related to M1)
4. Provide adequate funds, facilities and learning infrastructure (related to M1)
5. Produce superior research (competitive, innovative and competitive) in the field of physics (related to M2)
6. Utilizing research results in physics for science and technology enrichment and learning, quality improvement, progress and competitiveness of the nation, fulfillment of national development needs and knowledge-based society change (related to M2)
7. Disseminate research results in physical sciences through seminars, publications, patents and books at national and international levels (related to M2)
8. Produce community service that has quality in the field of physics to solve problems faced by the community, utilize appropriate technology, develop science and
enrich learning resources (related to M3).

9. Provide governance with excellent service (related to M4)

10. Increase local level cooperation with similar study programs, local government, business and industry that are relevant to the field of physics (related to M5).

11. Increasing cooperation at the national level of the National Ministry, Non-Ministerial Government Institutions and professional organizations/communities relevant to the field of physical sciences (related to M5).

12. Increasing international level cooperation with higher education institutions of other countries relevant to the field of physics (related to M5).

4) Learning Outcomes of Study Program Graduates

Learning outcomes in accordance with the KKNI are the internationalization of knowledge, attitudes, skills, competencies and accumulated work experience achieved through a structured educational process covering a particular field of knowledge or expertise or through work experience. SKL is a minimum criterion regarding the qualifications of graduates' abilities which include attitudes, knowledge, and skills, which are stated in the formulation of graduate learning outcomes (CPL).

Attitude

a. Fear of God Almighty and able to show a religious attitude;

b. Upholding human values in carrying out duties based on religion, morals, and ethics;

c. Internalize academic values, norms, and ethics;

d. To act as citizens who are proud and love their homeland, have nationalism and a sense of responsibility to the state and nation;

f. Appreciate the diversity of cultures, views, religions, and beliefs, as well as the opinions or original findings of others; Contribute to improving the quality of life in society, nation, state, and the progress of civilization based on Pancasila; Cooperate and have social sensitivity and concern for society and the environment;

h. Obey the law and discipline in the life of society and the state;

i. Internalize the spirit of independence, struggle, and entrepreneurship;

j. Demonstrate a responsible attitude towards work in their area of expertise independently.

Knowledge Mastery

a. Mastering the basics of Mathematics and Natural Sciences and their application in everyday life and technology

b. Mastering the theoretical concepts and basic principles of classical and quantum physics;

c. Mastering the principles and applications of mathematical physics, computational physics and instrumentation;

d. Mastering knowledge of technology based on physics and its application.

General Skills

a. Applying logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and/or technology in accordance with their field of expertise;

b. Reviewing the implications of developing or implementing science, technology or art in accordance with their expertise based on scientific principles, procedures and ethics to produce solutions, ideas, designs, or art criticisms as well as compiling a scientific description of the results of the study in the form of a thesis or final project report; Make the right decisions in the context of solving problems in their area of expertise, based on the results of analysis of information and data;

d. Manage learning independently;

e. Develop and maintain a network with supervisors, colleagues, peers both inside and outside the institution.

Special skill

a. Able to formulate physical symptoms and problems through analysis based on observations and experiments;

b. Able to produce mathematical models or physical models in accordance with the hypothesis or forecast of the impact of the phenomenon that is the subject of discussion;

c. Able to analyze various alternative solutions to physical problems and conclude them for making the right decisions;

d. Able to predict the potential application of physical behavior in technology;
e. Able to disseminate the results of the study of problems and physical behavior of simple symptoms in the form of standard scientific reports or suitable rule working papers.

5) Course Structure

Major : Physics  
Study program : Physics (S1)

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>credits</th>
<th>T</th>
<th>PL</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td></td>
<td>1. Expertise Course (MKBK)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>A. Mandatory</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FIS1.62.2001</td>
<td>Basic Physics</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>FIS1.62.5001</td>
<td>Waves and Optics</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>FMA1.60.1302</td>
<td>Calculus</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>FMA1.60.1303</td>
<td>General Physics</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of Credits: 18</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2)</td>
<td></td>
<td>2. University Compulsory Courses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>A. Mandatory</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>UNP1.60.1401</td>
<td>Religious education</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>UNP1.60.1402</td>
<td>Pancasila Education</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>UNP1.60.1403</td>
<td>Civic education</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>UNP1.60.1404</td>
<td>Indonesian</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>UNP1.60.1405</td>
<td>English</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>UNP1.60.3101</td>
<td>Entrepreneurship</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>UNP1.60.5401</td>
<td>Real Work Lecture (KKN)</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of Credits: 14</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3)</td>
<td></td>
<td>3. University Elective Courses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>A. Choice</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>UNP2.60.1401</td>
<td>Basic Natural Science</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>UNP2.60.1402</td>
<td>Basic Socio-Cultural Sciences</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>UNP2.60.2101</td>
<td>Physical Fitness Education</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>UNP2.60.2102</td>
<td>Japanese language</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>UNP2.60.2103</td>
<td>Multicultural Education</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>credits</th>
<th>T</th>
<th>PL</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>4)</td>
<td></td>
<td>4. Faculty Compulsory Courses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>A. Mandatory</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FMA1.60.2102</td>
<td>General Biology</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>FMA1.60.2103</td>
<td>General Chemistry</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of Credits: 8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5)</td>
<td></td>
<td>5. Study Program Compulsory Courses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>A. Mandatory</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FIS1.62.1001</td>
<td>Electronic Instruments and Statistical</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>FIS1.62.1002</td>
<td>Measurements for Physics</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>FIS1.62.202</td>
<td>Math Physics 1</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>FIS1.62.3001</td>
<td>Math Physics 2</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>FIS1.62.3002</td>
<td>Basic Electronics 1</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>FIS1.62.3003</td>
<td>Computer Mechanics Algorithm and</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>FIS1.62.3004</td>
<td>Programming</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>FIS1.62.3005</td>
<td>Thermodynamics</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>FIS1.62.3006</td>
<td>Biophysics</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>FIS1.62.3007</td>
<td>English for Basic Electronics</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>FIS1.62.4001</td>
<td>Physics 2</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>FIS1.62.4002</td>
<td>Electric and Magnet</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>FIS1.62.4003</td>
<td>Modern Physics</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>FIS1.62.4004</td>
<td>Earth Physics and Computational</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>FIS1.62.4005</td>
<td>Physics Astronomy</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>FIS1.62.4006</td>
<td>Used Electronics</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>FIS1.62.4007</td>
<td>Quantum Physics Disaster</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>FIS1.62.5002</td>
<td>Instrumentation</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>FIS1.62.5003</td>
<td>Solid Physics</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>FIS1.62.6001</td>
<td>Statistical Physics</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Number of Credits: 8
### B. Final Project/Thesis

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>credits</th>
<th>T</th>
<th>P</th>
<th>L</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1F</td>
<td>S1.62.8001</td>
<td>Thesis</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

### 6). Study Program Elective Courses

#### A. Choice

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>credits</th>
<th>T</th>
<th>P</th>
<th>L</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1F</td>
<td>S2.62.4001</td>
<td>Environmental Physics</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>2F</td>
<td>S2.62.4002</td>
<td>Electronic Equipment Systems</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>3F</td>
<td>S2.62.7001</td>
<td>Philosophy of Natural Science</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>4F</td>
<td>S2.62.6004</td>
<td>Photography</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>5F</td>
<td>S2.62.7003</td>
<td>Application Software for the</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>6F</td>
<td>S2.62.8001</td>
<td>History of Physics</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>7F</td>
<td>S2.62.8002</td>
<td>Applied physics</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

#### B. Choose 9 out of 18 credits of KBK Physics Mate Option Courses (sials dan Biophysics)

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>credits</th>
<th>T</th>
<th>P</th>
<th>L</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1F</td>
<td>S2.62.6004</td>
<td>Semiconductor Structure and Technology</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>2F</td>
<td>S2.62.6005</td>
<td>Materials Characterization Engineering</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>3F</td>
<td>S2.62.6006</td>
<td>Polymer Physics</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>4F</td>
<td>S2.62.7007</td>
<td>Medical Physics</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>5F</td>
<td>S2.62.7008</td>
<td>Crystallographic Physics</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>6F</td>
<td>S2.62.7009</td>
<td>Magnetic Material</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>6</td>
</tr>
</tbody>
</table>

#### C. Choose 9 of 18 credits of the KBK Electronics Elective Course and Instrumentation

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>credits</th>
<th>T</th>
<th>P</th>
<th>L</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1F</td>
<td>S2.62.6001</td>
<td>Control System</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>2F</td>
<td>S2.62.6002</td>
<td>Programmable Logic Control</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>6</td>
</tr>
</tbody>
</table>
Indonesia; Pancasila as a philosophical system, as the basis of the state of the Republic of Indonesia, as a state ideology, as an ethical system, and Pancasila as the basis for the value of developing science; Thinking and implementing Pancasila in dealing with current actual problems, such as human rights, racial and economic problems, and the problem of radicalism that must be solved in accordance with the values of Pancasila.

**UNP1.61.1403 Citizenship Education 2 Credits**

This course contains the nature of civic education in developing full undergraduate or professional abilities; the essence and urgency of national identity as one of the determinants of nation building and character, the urgency of national integrity and national unity; the constitutional values and norms of the 1945 Constitution of the Republic of Indonesia and the constitutional provisions of the legislation under the Constitution; harmony of obligations and rights of the state and citizens in a democracy that is based on people's sovereignty and deliberation for consensus; the nature, instrumentation, and practice of Indonesian democracy based on Pancasila and the 1945 Constitution of the Republic of Indonesia; the historical dynamics of constitutional, socio-political, cultural, and contemporary contexts of sovereign law enforcement; the historical dynamics and the urgency of the insight into the archipelago as a collective conception and view of the Indonesian nationality in the context of world relations; national urgency and challenges and defend the country for Indonesia in building a collective commitment to nationality.

**UNP1.61.1401 Religious Education 3 Credits**

The One and Only Godhead: faith and piety, divine philosophy (Theology); Humans: human nature, human dignity, human responsibility; Law: raise awareness to obey God's law, the prophetic function of religion in law: Moral: religion as a source of morals, morals in life; Science, Technology and Arts: Faith, science and technology, and charity as a unit, the obligation to demand and practice knowledge, the responsibility of scientists and artists; inter-religious harmony: religion is God's grace for all, togetherness in religious plurality; Society: civilized and prosperous society, the role of religious communities in realizing a civilized and prosperous society, human rights and democracy; Culture: academic culture, work ethic, open and fair attitude; Politics: the contribution of religious adherents to political life,

**UNP1.61.1402 Pancasila Education 2 Credits**

This course contains the meaning of urgency and reasons for the need for Pancasila education in Higher Education; Pancasila in the flow of the nation's history

2018 FMIPA Academic Manual
**UNP1.60.3101 Entrepreneurship 3 Credits**

This course contains knowledge, attitudes and skills based on creative and innovative thinking regarding the basic principles of entrepreneurship, entrepreneurial development models, entrepreneurial strategies, business ethics in entrepreneurship, opportunity analysis, business feasibility studies and business management (marketing, production, finance), resources, business legality, technology and information.

**UNP1.60.5401 Real Work Lecture (KKN) 2 Credits**

Real Work Lecture (KKN) is a field activity for students who are taking the final part of the S-1/D4/Applied Bachelor education program. This program is actually mandatory for all students, because the university believes that this program is able to encourage student empathy, and can contribute to solving problems that exist in society. Community service activities are a tangible form of the university's contribution to the community, industry, local government and community groups who want to be economically and socially independent. This KKN program requires Field Supervisors (DPL) and students to play an active role in knowing the existing problems, even before they plunge for 1 to 2.5 months in the middle Public. Concept "working with community" have replace concept "working for the community".

**UNP2.60.2101 Physical Fitness Education 2 Credits**

This course applies the effects and benefits of various movement activities for physical fitness and health through various games, competitions, and sports exercises as well as the ability to analyze the importance of physical activity to maintain and improve health.

**UNP2.60.2102 Japanese 2 Credits**

Japanese language courses equip students with knowledge about Japanese language practice so that students have the ability to read and communicate using Japanese.

**UNP2.60.2103 Multicultural Education 2 Credits**

This multicultural education course contains the concept of multicultural education: the urgency of multicultural education in a diverse Indonesian society, building an inclusive diversity paradigm through educational institutions, prospects and constraints of multicultural implementation, implementation of multicultural education in Indonesia, as well as character building of students through the application of multicultural ideology in the field of education.

**UNP2.60.1401 History of the Struggle of the Indonesian Nation 2 Credits**

The History of the Nation's Struggle course discusses the meaning and historical meaning of the nation's struggle, imperialism and colonialism, the struggle of the Indonesian nation against imperialism and colonialism, the Indonesian national movement, the struggle for independence, the meaning of the proclamation of efforts to maintain independence against various threats that threaten the unity state of the Republic of Indonesia, the Republic of Indonesia.

**UNP2.60.2401 Disaster Management 2 Credits**

This course refers to Law No. 24 of 2007 concerning Disaster Management (Disaster Management) which includes the introduction of facts or evidence of disaster events, introduction to the concept of disaster, types of disasters, characteristics of disasters, natural disasters, non-natural disasters, social disasters, prone, disaster/hazard (hazard), potential hazard, vulnerability, (vulnerability), capacity (capacity), principle of risk reduction (risk), prevention, mitigation, preparedness, disaster prediction, disaster impact, disaster response procedures and emergency response, analysis of rehabilitation needs.
UNP2.60.3401 MinangKabau Natural Culture 2 Credits
This course contains material on Minangkabau customs, both objective and subjective. Through the study of objective and subjective customs, students are expected to be able to understand Minangkabau human identity and be able to find the values of progress contained in adat that are relevant to the challenges of 21st century competence, namely multiculturalism, cooperation, problem solving and so on.

UNP2.60.3402 Information and Communication Technology 2 Credits
This course learns about information and communication technology that can make daily work easier. Understanding device usage “Office Applications” software, Internet Technology, Use of software development of learning animation, development of technology and use of applications in education and being able to recognize internet-based business.

FMA1.60.1302 Calculus 4 Credits
This course discusses the real number system, equations and inequalities, absolute values and absolute inequalities, coordinate systems and simple graphs, functions, limits and continuity, derivatives, related rates, graphs, and integrals.

FMA1.60.1303 General Physics 4 Credit Points
This course discusses quantities and units, particle kinematics, particle dynamics, work and energy, linear momentum, angular momentum and rigid bodies, static fluids, dynamic fluids, concepts of temperature and heat, and the laws of thermodynamics.

FMA1.60.2102 General Biology 4 Credit Points
This course discusses the knowledge of living things and scientific methods, cells as the basis of life, metabolism, structure and organization of plant and animal bodies, biodiversity, structure, functions and processes in human organ systems, ecology, genetics and evolution and biotechnology.

FMA1.60.2103 General Chemistry 4 Credit Points
This course discusses Stoichiometry, Chemical Energetics, Atomic Structure, Periodic System of Elements, Chemical Bonds and Molecular Geometry, Forms of Matter

2018 FMIPA Academic Manual

and Chemical Equilibrium

FIS1.62.1001 Electronic and Measurement Instruments 3 Credits
Electronic instruments and measurement courses discuss the concepts of measurement and error, direct current meters, direct current bridges, alternating current meters, alternating current bridges, multimeters, oscilloscopes, electronic measuring instruments in Physics and Applications of Physics instruments in various fields.

FIS1.62.1002 Statistics for Physics 3 Credits
Basic notions in statistics, data presentation, center size and location size, symmetry and slope, deviation size, probability theory and probability distribution, sampling distribution, some tests include: normality test, homogeneity test of variance, regression linearity test and correlation. Non-parametric statistics include: sign test, Wilkoxon test, and Liliefors test.

FIS1.62.2001 Basic Physics 4 Credits
The basic physics course discusses the basic concepts of electricity, magnetism, vibration, waves, optics and modern physics.

FIS1.62.2002 Mathematical Physics 1 3 Credits

FIS1.62.3001 Mathematical physics 2 3 credits

2018 FMIPA Academic Manual

**FIS1.62.3002 Basic Electronics 1.3 Credit Points**
Basic laws of electricity (Ohm's law, Joule, Kirchhoff and others), basic circuits using passive components and active components include: voltage divider circuits, current dividers, equivalent circuits, capacitor charging and discharging, passive signal processing circuits, RLC circuits, semiconductor diodes, rectifier and waveforming circuits, bipolar transistors and transistors as amplifiers.

**FIS1.62.3003 Computer Programming and Algorithm 3 Credits**
Operating system of a number, programming algorithms in the form of Flowcharts, Basic Programming which includes the basics of Pascal Language, Graphics Programming, and Animation of basic concepts of physics problems.

**FIS1.62.3004 Mechanics 3 Credit Points**
This course discusses the relationship between dimensions of mechanics and variables (scalars and vectors) in various mechanics concepts. Two- and three-dimensional kinematics about position vectors, velocity and acceleration, differential and integral applications in mechanical systems with Cartesian, polar, cylindrical and spherical coordinates. Particle dynamics are described through Newton's laws of motion, positional, velocity and time functions, Kepler's laws of orbit, motion of the central force, gravity, gravitational potential, equipotential forces & surfaces, and explain the phenomena of motion under the influence of gravitational force and gravitational potential. Analysis of linear and angular momentum, impulse, work and energy, laws of conservation of energy and momentum. Rigid body mechanics is described in terms of linear and angular momentum, linear and angular velocity, torque, moment of inertia, motion of center of mass system, center of mass velocity, center of mass coordinate system and, principal moment of inertia and principal axis, perpendicular axis theorem, some properties of inertia tensor. In Lagrange and Hamilton mechanics, general coordinates, general forces, kinetic and potential energies, Lagrange and Hamilton equations for various motion systems are described.

**FIS1.62.3005 Thermodynamics 3 Credit Points**

**FIS1.62.3006 Biophysics 3 Credits**
This course discusses Health Physics, Diagnostic Radio Physics, Nuclear Medicine and Medical Instrumentation covering Ionizing radiation in tissues, Electromagnetic biological effects, Sonic irradiation, Molecular effects of ionizing radiation, Thermodynamics and Biology, Non-reverse thermodynamics, Diffusion, permeability & active transport, Membranes - Biological membranes, Information theory & Biology, Energy Transfer Processes and Radioactive tracer techniques and their applications.

**FIS1.62.3007 English for Physics 2 Credits**
This course contains Basic English Grammar, writing patterns in English, general patterns of reading English books, practice reading books and translating English reading materials.

**FIS1.62.4001 Basic Electronics 2.3 Credits**
This course discusses voltage amplifier circuits, buffer circuits, DC coupled amplifier circuits, transistor switch circuits and applications, multivibrator circuits with transistors and applications, operational amplifier circuits and applications.

**FIS1.62.4002 Electricity and Magnetism 3 Credits**
This course covers: electrostatics concepts, special techniques for calculating potential, electrostatic fields in materials, magnetostatics, magnetostatic fields in materials, electrodynamics, conservation law, and Maxwell's equations and electromagnetic waves.

**FIS1.62.4003 Modern Physics 3 Credits**
The material includes the concepts of: Introduction, Einstein's Special Theory of Relativity, Quantum phenomena, Atomic Structure, Quantum Theory of the Hydrogen Atom, Many Electron Atoms, and Molecules.

**FIS1.62.4004 Earth Physics and Astronomy 3 Credit Points**
This course discusses general knowledge of the earth and astronomy, including the structure of the earth, hydrosphere, atmosphere, weather and climate as well as natural disasters.
and disaster mitigation as well as the solar system, stars, celestial sphere, ecliptic coordinate
system and the universe

**FIS1.62.4005 Computational Physics 3 Credits**
The Computational Physics course presents various (numerical) approaches that
are widely used in solving physics problems. The discussion includes error
problems, solving nonlinear equations, systems of linear equations, polynomial
interpolation, differential and numerical integrals, and initial value problems of
ordinary differential equations, solutions of ordinary differential equations,
solutions of partial differential equations.

**FIS1.62.4006 Used Electronics 3 Credits**
Discusses the application of basic electronic circuits in regulated power supplies,
function generators, measurement systems, regulatory systems, object counting
systems, and various hobby electronics circuits. Besides, it also discusses
electronic equipment contained in life including radio systems, television
systems and computer systems.

**FIS1.62.4007 Disaster Instrumentation 2 Credits**
This course discusses the introduction of systems and the workings of the tools
used to detect natural disasters such as earthquakes (seismographs), landslides
(remote sensing), tsunamis and volcanoes.

**FIS1.62.5001 Waves and Optics 3 Credits**
Harmonic vibrations, one, two and three dimensional waves, sound waves,
electromagnetic waves, modulation, polarization, interference, diffraction, lasers and
holography.

**FIS1.62.5002 Quantum Physics 3 Credits**
Quantum Physics discusses the quantum phenomena that underlie quantum
mechanics and their application in simple examples. Topics-topics covered include
wave-particle dualism, fundamentals of quantum physics, general properties of
solving one-dimensional Schrodinger equations, angular momentum, time-
independent perturbation methods and identical particle systems.

**FIS1.62.5003 Physics of Solids 3 Credit Points**
Solid matter physics course discusses X-ray diffraction methods, crystal bonds,
lattice vibrations, heat capacity, free electron theory, energy band theory and
semiconductor crystal.

**FIS1.62.6001 Statistical Physics 3 Credits**
This course discusses Probability Theory, Kinetic Theory of Gases, Velocity and
Rate Distribution Functions, Transport Phenomena, Maxwell Boltzmann

**FIS1.62.6002 Core Physics 3 Credits**
This course covers: core structure; core properties; radioactivity; radiation
detector; alpha, beta and gamma decay; radiation protection; core reaction; core
styles and models; nuclear fission; nuclear energy plants; accelerators, and
elementary particles.

**FIS1.62.6003 Modern Optics and Photonics 3 Credits**
This course provides knowledge about the application of waves to optical
materials. Examples include scanners in supermarkets, photocopiers, compact
disk players, holograms, and fiber optics for communication. Therefore, after
students take this course, they can analyze problems in optical materials based
on the knowledge of waves that have been obtained.

**FIS1.62.6004 Research Methodology and Publication 3 Credits**
This course describes analyzing the nature, concepts and approaches of scientific
research, quantitative and qualitative research, deductive and inductive analysis
in research, scientific research procedures, techniques for determining research
subjects and objects, research data processing and analysis techniques, and
scientific publication techniques of research results. , train students in designing
and producing research designs, and train students to present research proposal
designs in character in class discussions.

**FIS1.62.6005 Physics Seminar 2 Credits**
This course presents techniques for making good presentation media, good
presentation techniques. Physics seminar exercises: choosing physics topics for
papers, writing simple papers, making media presentations, conducting
seminars with panel discussions.
FIS1.62.7001 Radiation Physics 3 Credits
The course discusses the properties of nuclear radiation, radiation in materials, radiation measurements, error statistics, types of detectors, electronic circuits for radiation detection, X-ray spectroscopy, data analysis methods, radiation physics applications, and radiation protection.

FIS1.62.7002 Field Work Practice 2 Credits
Refresher lectures and provision of field work knowledge where the participating students are, observation exercises in the form of reports that are ready for seminars in order to determine the mastery of the applied physics material.

FIS1.62.8001 Thesis 6 Credits
Submission of research proposal outlines to study program heads, acceptance of research proposal outlines, determination of supervisors 1 and 2, research proposal writing, research proposal seminars, research proposal refinement, research implementation, research report preparation, thesis examination, research report improvement, and article writing -journal.

FIS2.62.4001 Environmental Physics 2 Credits
Analyzing and interpreting the physical environment of the earth, minerals and rocks, layer structure and earthquake mechanisms, with parameters of temperature, pressure, humidity, dynamics of sea water and tides, ocean currents, atmospheric structure, temperature, pressure, wind speed, and heating with its mechanisms, as well as environmental impact analysis. Analyzing the astrophysical environment: stars, sun, planets, moons, spectrum, dynamics of celestial bodies, astrophysic parameters and instruments and their lessons.

FIS2.62.4002 Electronic Equipment System 2 Credits
This course discusses several topics about electronic equipment systems which include analog and digital electronic equipment systems, communication equipment systems (wave, radio, television, mobile phones), computer systems, household electronic equipment, electronic systems for health and several other latest electronic equipment systems.

FIS2.62.5001 Analog Electronics 3 Credits
This course discusses sensor signal amplifiers, functional processing, second and fourth order active filters, electronic circuits using timer ICs, electronic circuits using function generator ICs.

Voltage controlled oscillator (VCO), LED drive IC, voltage and current regulator, relay drive electronic switch, electronic components with pn-pn devices, circuit applications in electronics-based instruments.

FIS2.62.5002 Digital Electronics 3 Credits
This course will discuss the binary number system, Boolean algebra, DeMorgan’s theorem, Karnaugh maps. Logic elements: logic switches, logic gates, memory elements, digital ICs (TTL and CMOS). Digital Multivibrators: Digital Schmitt triggers, digital bistables, digital monostable and astable multivibrators. Combination Logic Circuits: Adder, Subtractor, decoder, endoder, multiplexer, demultiplexer, ROM. Sequential Logic Circuits: Latches, flip-flips, registers, shift registers, counters and scalers. Digital to analog converter (DAC), analog to digital converter (ADC), Digital display: seven segment and LCD. Applications in instruments: digital electronic thermometers, three-decade counters, digital capacitance meters and others.

FIS2.62.5003 Sensor System 3 Credits
This course will discuss the meaning of sensors and sensor systems as well as the working principle of sensors in physics, measurement and error and relate them to accuracy, accuracy, apply statistical analysis, and errors in measuring sensor results, understand sensors based on changes in position and displacement, optics, speed and acceleration, humidity of a material and materials, fluid flow and force. Understand the working principle of each sensor based on symptoms and changes Able to try several simple sensors, and have the ability to apply it in the form of a final project to make or assemble sensors, sensor systems, able to use measuring tools supporting sensors such as measuring inrness, pressure, fluxmeters, capacitance meters and other measuring instruments in the laboratory.

FIS2.62.5004 Introduction to Materials Science 3 Credits
This course will discuss the properties of materials, chemical bonds, atomic arrangement in solids, metals, semiconductors, ceramic materials, polymers, magnetic materials, dielectrics, optics, composites and their physical properties as well as biophysical materials.

FIS2.62.5005 Physics of Electronic Materials 3 Credits
This course will discuss the Physics of Semiconductor Technology, Physics of Semiconductor Devices, Thin Layer Technology, Electronic Structure of Materials.
Semiconductor materials, including semiconductor crystal structures, energy band structures of semiconductor materials, charge carrier density, transport mechanisms in semiconductors, junctions in semiconductors, intrinsic and extrinsic semiconductors, phenomena of charge carrier transformation, p-junctions n, Bipolar devices, Semiconductor manufacturing technology, Crystal growth and epitaxy, Film oxidation and deposition, Diffusion and ion implantation, Lithography and etching.

FIS2.62.5006 Energy Physics 3 Credit Points
This course discusses Renewable Energy, Biomass, Energy Conservation and Nuclear Energy covering national energy needs and energy supply, energy sources and future energy needs, solar energy, wind, water, hybrid, biomass, pyrolysis, anaerobic digestion, biogas technology, biodiesel and nuclear.

FIS2.62.5007 Introduction to Geophysics 3 Credits
This course discusses various earth phenomena based on physical principles such as gravity, rotation, waves, electricity, magnetism and applies basic physics theories to geophysical survey methods and the practice of geophysical methods in surveying natural resources.

FIS2.62.5008 Geophysical Data Processing Techniques 3 Credits
This course discusses the basics of mathematical and computational operations for processing geophysical data including signals and systems, fourier series, and fourier transformations, sampling and alliances, convolution and deconvolution, correlation and autocorrelation, filters and transfer function estimation.

FIS2.62.5009 Geology Physics 3 Credit Points
This course discusses the structure of the earth and the minerals that make up the earth, the dynamic processes that take place in the earth's crust, time and changes in the earth's surface including climate change, the potential of natural resources and examines related physical concepts.

FIS2.62.5010 Advanced Computational Physics 3 Credits
This course discusses solving elliptic and parabolic partial equations, Monte Carlo method, finite differential method (2-D,3-D), finite element method (2-D,3-D), boundary condition problems, eigenvalues, linearization, polynomial fittings, splines, Fourier transforms, numerical solutions of equations

Schroedinger and random numbers.

FIS2.62.5012 Group Theory and Symmetry in Physics 3 Credit Points
This course discusses groups and fields: definition of groups, fields, translational groups, orthogonal and Poincare; geometry and vector space: a review of flat Euclid and Minkowski geometries, translational groups, O(N), U(N) groups, Lorentz boosts, SL(2,C) groups and Poincare groups; relativistic wave equations: Klein-Gordon equation, Dirac equation, Clifford algebra, Maxwell equation; Lagrange formulations: Yang-Mills theory, Yang-Mill-Higgs theory and spontaneous symmetry breaking: definition of vacuum, Goldstone's theorem and monopole theory and soliton theory and examples.

FIS2.62.6001 Control System 3 Credits
This course will discuss about structured logic system design, Flowchart-based design, state-based design, control system modeling, basic control actions, response analysis, and control system optimization.

FIS2.62.6002 Programmed Logic Control 3 Credits
This course will discuss the definition and working principle of programmed logic control, basic principles of programmed logic control programming, hardware of programmed logic control, latching, timers, counters and applications of programmed logic control in various fields.

FIS2.62.6003 Microcontroller 3 Credits
This course will discuss about the 8051 microcontroller, programming with assembly language, arithmetic and logic instructions, minimum systems, timer and counter microcontroller settings, Arduino and its applications as well as microcontroller interface systems with various other devices.

FIS2.62.6004 Semiconductor Structure and Technology 3 Credits

2018 FMIPA Academic Manual

2018 FMIPA Academic Manual
This course will discuss characterization of mechanical properties of materials, characterization of electrical properties of materials, characterization of magnetic properties of materials, characterization of optical properties of materials, characterization of thermal properties of materials, characterization of topography and microstructure of materials and characterization of chemical constituents.

This course material concerns the basic principles of polymers, mechanical and electrical properties of polymers, molecular weights, chemical structure of polymers, evaluation of polymer characteristics and polymer analysis.

This course discusses the basic theory of measurement, modeling, and data interpretation and the model of the electrical resistivity method, the spontaneous self potential method, the induced polarization method, and the theory of the electromagnetic method and the conductivity of rocks and minerals.

This course discusses the definition of the Electromagnetic and MT methods, the basic theory of the MT and VLF methods, impedance, resistivity of the earth's structure, measurement systems for the VLF and MT methods, the earth's response function through the MT and VLF methods, data processing and data analysis, data interpretation and CSAMT.

This course will discuss the introduction of Earth's magnetic field, rock magnetic properties, Magnetic minerals, NRM acquisition, NRM sampling and measurement, Stability, paleomagnetism, Paleomagnetic data statistics and paleomagnetic applications.

This course discusses geophysical methods to determine differences in rock density below the earth's surface which includes: introduction to gravity and magnetic methods, basic concepts of gravity, gravity measurements, gravity meter equipment, corrections for gravitational observations, interpolation of gravity data, basic concepts of magnetic methods, the earth's magnetic field, magnetic instruments, magnetic surveys and interpretation of magnetic data.

This course discusses programming techniques using the Delphi programming language, understanding the Delphi work environment, Delphi components, using visual and non-visual components, using components related to data, creating and using components, creating applications, graphics, multimedia, animation, database application creation and error handling.

This course design physics visualization and physics visualization support software, physics visualization basics, introduction to java apple, introduction to streaming processor, introduction to GPU, parallel data processing, animation basics, simulation basics and examples of visualization with simulation.

This course discusses Application Programs which include Wavelets and Multiresolution Processing, Image Compression, Morphological Image Processing, Image Segmentation and Representation and Description

This course discusses the types of elementary particles and their interactions and is able to perform simple collision scattering calculations, brief history of elementary particles, dynamics and fundamental forces, leptons and quarks; scattering and decay; group symmetry and the law of conservation, CPT theorem; tera principle, Feynman diagram, weak interaction and unification.

This course discusses the introduction to seismic methods, theory of seismic wave propagation, energy partitioning in the boundary layer, seismic wave geometry, seismic velocity, characteristics of seismic sources, equipment used in data collection, earthquake seismology, seismic reflection methods, processing reflection seismic data, geological interpretation of reflection seismic, refractive seismic method, processing and interpretation of refractive seismic data, 3-D seismic and special application of seismic method.
**FIS2.62.7001 Philosophy of Natural Sciences 2 Credits**
Knowledge and science, the meaning of philosophy, Natural Sciences (IPA), philosophy of science, philosophy of philosophy, building philosophy of science: ontology, epistemology, axiology, the relationship between philosophy and education, sources of science knowledge, development of reasoning in science, advancing basic science, directing basic science and behavior in advancing basic science.

**FIS2.62.7002 Photography 2 Credits**
Basic knowledge and principles of photography; camera type, characteristics, and how the camera works; various positions and techniques in shooting, use of light sources in photography, types and types of films and their characteristics, various materials and working processes, darkroom processes, black and white film processes, printing and enlarging black and white photos and exhibitions of photographic works.

**FIS2.62.7003 Application Software For Science 2 Credits**
Discussion of the basics of computers, computer operating systems, computer application software, various computer application software, the use of computer application software such as Matlab, Maple, Arcview, and Labview in solving simple physics problems.

**FIS2.62.7004 Mechatronics 3 Credits**
Mechatronics is a combination of several fields of science which include sensor systems, mechanical engineering, electronic systems, computer engineering and control systems. This course will discuss the concepts of mechatronics, sensor components, actuators, signal conditioners, controllers as well as examples and working principles of various mechatronic devices.

**FIS2.62.7005 FPGA Device Programming 3 Credits**
FPGA Device Programming is programming of integrated circuit devices according to user requirements. This course will discuss the comparison of FPGA technology, FPGA Architecture, FPGA Design, VHDL Programming, Simulation and Synthesis as well as Case Studies on the CPLD Board.

**FIS2.62.7006 Remote Sensing 3 Credits**
Remote sensing is a science or technique to obtain information about a target or area using an instrument without the need for direct contact with the target or area. This course will discuss the meaning of remote sensing, the basics of physics and sensors, microwaves, interpretation and analysis of image data (image/imagery) as well as examples of remote sensing applications.

**FIS2.62.7007 Medical Physics 3 Credits**

**FIS2.62.7008 Crystallographic Physics 3 Credits**
The lecture will discuss Sample Preparation, Crystal Diffraction Methods and Crystal Structure Analysis including Crystal Growth Methods, X-Ray Diffraction, Neutron Diffraction, Synchrotron Diffraction, Sample Specifications, Back Gratings, Crystal Systems and Braves, Symmetry Operations, Point Groups, Space Groups and Crystal Structure Analysis from diffraction data.

**FIS2.62.7009 Magnetic Material 3 Credits**
This course covers the magnetic properties of a magnetic material, experimental methods, domains, quantum theory of magnetic materials.

**FIS2.62.7010 Computational Geophysics 3 Credits**
This course discusses data recording and reading techniques, data operations (1-D, 2-D, 3-D), linearization, polynomial fitting, random number generator, data correlation, potential problem solutions using the differential method and the finite element method (1-D, 2-D, 3-D), elastic deformation problems, viscous flow problems, data recording and reading, one-dimensional data operations, data minimum and maximum (1-D, 2-D), forward modeling, inversion modeling and adaptive damping method.
**FIS2.62.7011 Geodynamics 3 Credit Points**

This course discusses the basic processes of physics to understand Earth’s plate tectonics and various other phenomena related to geology, including Earth’s plate tectonic phenomena, Earth’s dynamics and their applications as well as elasticity properties (stress, strain, flexure), heat transfer and their applications.

**FIS2.62.7012 Geophysical Instrumentation 3 Credits**

This course has study materials on instrumentation in earthquake seismology, instrumentation in meteorology, instrumentation in magnetism. The study material in the lecture will discuss the wave ADC seismic, seismic networks and stations, land and marine atmosphere, meteorology, instrumentation.

**FIS2.62.7013 Digital Image Processing 3 Credits**

This course discusses computer programming which includes basic digital image processing, image improvement in the spatial domain, image improvement in the frequency domain, image restoration and image color processing.

**FIS2.62.7014 Artificial Intelligence 3 Credits**

This course discusses Fuzzy and Neural Networks, covering the introduction of AI modeling methods, intelligence agents, solving search problems, information search and exploration, opponent search, logical agents, uncertainty, fuzzy recognition, probabilistic reasoning, Hopfield neural networks, genetic algorithms, statistical learning (SVM), Yin Yang computing, neutrosophic theory and case studies of physics problems and AI-based modeling.

**FIS2.62.7015 Introduction to Non-Linear Physics 3 Credits**

This course discusses various nonlinear physical phenomena that exist in several mediums including non-linear waves in water, air, superconductors and optical materials and their application to shallow sea waves such as tsunami waves, atmospheric Rossby waves and in the field of optical communication.

**FIS2.62.7016 Electromagnetic Interaction in Materials 3 Credits**

This course will discuss the response of matter to electromagnetic fields. The main topics discussed in this course include the definition of optical constants; the interaction of electromagnetic fields with non-absorptive dielectrics; the interaction of electromagnetic fields with metals, basic concepts.
3. Study Program: Physics Education (S2)

1) Vision
Center of excellence that produces Masters in the Field of Physics Education who are Professional, Character, and Scholar Based on Faith and Piety to God Almighty in 2020

2) Mission
UNP Physics Education Study Program S-2, in order to produce graduates who have character based on faith and piety, then carry out the mission:

1. Organizing superior education in the field of Physics education.
2. Conducting excellent research in the field of Physics education.
3. Organizing excellent service and community service in the field of Physics education.
4. Produce graduates of Master of Physics Education who are professional, intellectual, with character, faith, and fear of God Almighty One.

3) Purpose
1. Prepare students in the field of Physics education to become a member professional, qualified, and competitive society in the field of Physics education.
2. Developing Physics education science through superior reasoning and research
3. Apply and disseminate knowledge in the field of Physics education based on faith and piety through superior community service.
4. Continuing the tradition of excellence to develop students to become intellectual, character, faithful, and pious and to produce master’s graduates through inter and inter-science approaches so that they are able to enter or create jobs in the field of Physics education.

4) Graduate Competencies
Competence of graduates (learning outcomes) Master in Physics Education is as follows:
1) Developing science education or practice implementation, Professional physics learning produces through research for innovative and tested works.
2) Solving physics education problems by utilizing education and related sciences through an inter- or multidisciplinary approach.

3) Have the ability to integrate phenomena and local wisdom as learning resources into physics learning tools. Responsible and committed as a physics education expert.
4) Think openly, critically, innovatively, and confidently as a physics education expert.
5) Have the ability to communicate with students, peers, and the community.
6) Mastering the concepts, laws and theories of physics and applying them.
7) Mastering the concepts, principles and theories that underlie learning and learning physics.
8) Have the ability to develop a physics education curriculum at the education unit level.
9) Have the ability to develop innovative physics learning models.
10) Have creative and innovative abilities in developing teaching materials, media and learning resources.
11) Have the ability to develop assessments in learning physics.
12) Have the ability to apply and develop physics learning creatively and innovatively.
13) Have broad insight into the development of national and international physics education.
14) Have the ability to manage research through assessment and development in the field of physics education, the results of which are applicable and worthy of publication at the national or international level in the form of scientific publications in accredited scientific journals.

5) Course Structure

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total</td>
</tr>
<tr>
<td>1) Study Program Compulsory Courses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Mandatory</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>F1.81.1006</td>
<td>Classical Mechanics</td>
<td>32</td>
</tr>
<tr>
<td>2.</td>
<td>F1.81.1007</td>
<td>Electrodynamics</td>
<td>32</td>
</tr>
</tbody>
</table>

2018 FMIPA Academic Manual
### 4. Study Program: Physics (S2)

#### Course Structure

**Physics major**

**Study Program : Physics (S2)**

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>FIS1.82.1001</td>
<td>Disaster Physics</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>FIS1.82.1002</td>
<td>Information Systems and Disaster Communication</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>FIS1.82.1003</td>
<td>Research Methodology</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>FIS1.82.1004</td>
<td>Classical Mechanics</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>FIS1.82.1005</td>
<td>Electrodynamics</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>FIS1.82.2001</td>
<td>Quantum Mechanics</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>FIS1.82.2003</td>
<td>Statistical Mechanics</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>FIS1.82.2010</td>
<td>Disaster Risk Reduction</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>FIS1.82.3009</td>
<td>Scientific Writing and Publication</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

#### 1) Study Program Compulsory Courses

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>FIS1.82.3002</td>
<td>Thesis Exam</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>FIS1.82.3003</td>
<td>Thesis Proposal Seminar</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>FIS1.82.3006</td>
<td>Research Results Seminar</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

#### B. Final Project/Thesis

Number of Credits: 24

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>FIS1.82.2011</td>
<td>Thesis proposal</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>FIS1.82.3007</td>
<td>Results Seminar</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>FIS1.82.3008</td>
<td>Thesis Exam</td>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>

#### 2) Study Program Elective Courses

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>FIS2.82.2003</td>
<td>Learning Design</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>FIS2.82.2004</td>
<td>Curriculum</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

Number of Credits: 4

---

2018 FMIPA Academic Manual
4. Chemistry Department

a. Vision
To become an excellent department in the field of Chemistry and Chemistry Education based on the values of piety to God Almighty.

b. Mission
1) Produce graduates who have high academic abilities and are professional in the field of Chemistry and Chemistry Education and can develop science and technology.
2) Make the academic community of the Department of Chemistry with a high academic culture and proactive in implementing the Tridharma of Higher Education.
3) Providing services to the community in the field of chemistry and chemistry education.
4) Produce graduates who are able to apply their knowledge for themselves, their families and communities, as well as employment.
5) Produce graduates as qualified members of society and actively participate in development.
6) Cooperating with other universities and related institutions in improving the implementation of the Tridharma of Higher Education.
7) Become the best FMIPA UNP in the field of Mathematics and Natural Sciences, in addition to its main task of producing professional Mathematics and Natural Sciences education staff based on faith and piety.
8) Organizing Education to produce graduates who have high academic abilities and professionalism in the fields of Mathematics and Natural Sciences and education

c. Destination
1) Improving the efficiency and effectiveness of education and teaching in the field of chemistry.
2) Produce graduates who are able to compete in the job market.
3) Participate in improving the quality of chemistry education in schools and universities.
4) Produce graduates who can follow further studies.
5) Produce research that can be implemented to improve people’s living standards.

d. Study program
The Department of Chemistry, FMIPA UNP has two study programs, namely the Chemistry Education study program and the Chemistry study program.
e. Study Load
To complete undergraduate and postgraduate studies in Chemistry, students are required to have passed at least 144 credits of courses which include compulsory courses (138 credits for Chemistry Education Study Program, and 126 credits for Chemistry Education Study Program) and a minimum of elective courses (6 credits for Chemistry Education Study Program) and 18 credits for PS Chemistry.

1. Chemistry Education Study Program (S1)

1) Vision
To become a superior, dynamic and quality study program in Western Indonesia in the Field of Chemistry Education in 2020 based on the values of piety to God Almighty.

2) Mission.
   a. Carry out quality, professional and superior Chemistry Education based on faith and piety
   b. Carry out research in the field of chemistry education
   c. Providing quality services to the community in the field of Chemistry Education.
   d. Increase cooperation with other universities and related institutions.

3) Destination
The aim of the Chemistry Education Study Program is to produce educational graduates who:
   a) Mastering chemistry teaching materials comprehensively and able to teach (scientific communication) well based on the applicable curriculum.
   b) Able to apply knowledge and skills in the field of chemistry education.
   c) Able to work both in the field of chemistry education and in social life.
   d) Able to follow the development of science, technology and art and can apply it in teaching chemistry.

4) Competencies of Graduates of Chemistry Education Study Program
Work ability
   Able to describe SK and KD chemistry into learning Able to make chemistry learning tools
   Able to provide alternative solutions to chemistry learning problems
   Able to use IT in learning chemistry creatively

Knowledge Mastery
Mastering school chemistry and its enrichment, learning theories, lesson planning, learning media, learning strategies, studying the school chemistry curriculum, evaluating the learning outcomes process and mastering IT for learning.

6) Course Structure
Major : Chemistry
Study program : Chemistry Education (S1)

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>T</th>
<th>P</th>
<th>L</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td>Science and Skills Course (MKK)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A Required</td>
<td></td>
<td>FMA1.60.1304 Generic Chemistry</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>KIM1.61.2103 Basic Chemistry</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of Credits</td>
<td>8</td>
<td>6</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td>University Compulsory Courses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A Required</td>
<td></td>
<td>UNP1.60.1401 Religious education</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UNP1.60.1402 Pancasila Education</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UNP1.60.1403 Indonesian Citizenship</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UNP1.60.1404 Education</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UNP1.60.1405 English</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UNP1.60.3101 Entrepreneurship</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UNP1.60.5401 Real Work Lecture (KKN)</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UNP1.61.1201 Fundamentals of Education</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UNP1.61.2101 Psychology Education</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UNP1.61.2102 Education Administration And Supervision</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UNP1.61.2103 Philosophy of Education</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UNP1.61.4201 Guidance and counseling</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UNP1.61.5101 Experience Program Field 1 (PPL1)</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UNP1.61.6401 Experience Program Field 2 (PPL 2)</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UNP1.61.7401 Experience Program Field 3 (PPL 3)</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>No</td>
<td>Code</td>
<td>Courses</td>
<td>SKS</td>
<td>T</td>
<td>P</td>
<td>L</td>
<td>B</td>
</tr>
<tr>
<td>----</td>
<td>-----------------</td>
<td>----------------------------------------------</td>
<td>-----</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>3) Ma'ata University Elective Course</td>
<td>Choose 2 credits from 18 credits</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>UNP2.60.1401</td>
<td>Basic Natural Science</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>UNP2.60.1402</td>
<td>Basic Socio-Cultural Sciences</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>UNP2.60.2101</td>
<td>Fitness Education</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>UNP2.60.2102</td>
<td>Japanese language</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>UNP2.60.2103</td>
<td>Multicultural Education</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>UNP2.60.2401</td>
<td>History of the Indonesian Nation's Struggle</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>UNP2.60.2402</td>
<td>Disaster Management</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>UNP2.60.3401</td>
<td>Natural Culture MinangKabau</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>UNP2.60.3402</td>
<td>Information and communication technology</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

**Number of Credits: 31**

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>T</th>
<th>PL</th>
<th>B</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>4) Faculty Compulsory Courses</td>
<td>Required</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>FMA1.60.1301</td>
<td>General biology</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>FMA1.60.1302</td>
<td>Calculus</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>FMA1.60.2104</td>
<td>General Physics</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

**Number of Credits: 10**

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>T</th>
<th>PL</th>
<th>B</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>5) Study Program Compulsory Courses</td>
<td>Required</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>KIM1.61.2104</td>
<td>English For Chemistry</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>KIM1.61.2105</td>
<td>Mathematics Chemistry</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>KIM1.61.3101</td>
<td>Physical Chemistry</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>KIM1.61.3102</td>
<td>Organic Chemistry</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>KIM1.61.3103</td>
<td>Analytical Chemistry</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>KIM1.61.3104</td>
<td>Structure of School Chemistry</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>KIM1.61.3201</td>
<td>Inorganic Compounds</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>KIM1.61.3202</td>
<td>Chemistry Lesson Planning</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>KIM1.61.4101</td>
<td>Chemistry learning evaluation</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>

**Number of Credits: 31**

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
<th>T</th>
<th>PL</th>
<th>B</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>6) Study Program Elective Courses</td>
<td>Choose 8 credits from 40 credits</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>KIM2.61.1101</td>
<td>Chemical environment</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>KIM2.61.1102</td>
<td>computer application</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>KIM2.61.6011</td>
<td>Computer application</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>KIM2.61.6201</td>
<td>Visits Educational Institutions</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
</tbody>
</table>

**Number of Credits: 31**

2018 FMIPA Academic Manual
develop full undergraduate or professional abilities; the essence and urgency of
cultural and character, the urgency of national integrity and national unity; the constitutional values
and norms of the 1945 Constitution of the Republic of Indonesia and the
constitutional provisions of the legislation under the Constitution; harmony of
obligations and rights of the state and citizens in a democracy that is based on
people's sovereignty and deliberation for consensus; the nature,
imstrumentation, and practice of Indonesian democracy based on Pancasila and the
1945 Constitution of the Republic of Indonesia; the historical dynamics of
constitutional, socio-political, cultural, and contemporary contexts of sovereign
law enforcement; the historical dynamics and the urgency of the insight into the
archipelago as a collective conception and view of the Indonesian nationality in
the context of world relations;

UNP1.60.1401 Religious Education 3 Credits
The One and Only God: faith and piety, philosophy (Theology); Human: human nature, human dignity, human responsibility Law;
raise awareness to obey God's law, prophetic function of religion in law: Moral:
religion as a source of morals, morals in life Science, Technology and Arts: Faith,
science and technology, and charity as an obligation to demand and practice
knowledge, the responsibility of scientists and artists; inter-religious harmony:
religion is a blessing from God for all, togetherness in religious plurality; Society:
civilized and prosperous society, the role of religious communities in realizing a
civilized and prosperous society, Human Rights (HAM) and democracy; Culture:
academic culture, work ethic, open and fair attitude; Politics: the contribution of
religious adherents to political life, the role of religious adherents in realizing
national unity.

UNP1.60.1402 Pancasila Education 2 Credits
This course contains the meaning of urgency and reasons for the need for
Pancasila education in Higher Education; Pancasila in the current history of the
Indonesian nation; Pancasila as a philosophical system, as the basis of the state
of the Republic of Indonesia, as a state ideology, as an ethical system, and
Pancasila as the basis for the value of developing science; Thinking and
implementing Pancasila in dealing with current actual problems, such as human
rights, racial and economic problems, and the problem of radicalism that must
be solved in accordance with the values of Pancasila.

UNP1.60.1403 Citizenship Education 2 Credits
This course contains the nature of citizenship education in

2018 FMIPA Academic Manual
UNP1.61.2102 Administration and Education Supervision 2 Credits
Educational Administration and Supervision courses are courses that provide insight, basic concepts and processes as well as the scope of Educational Administration and Supervision and apply them in professional school management.

UNP1.61.2103 Philosophy of Education 2 Credits
The Philosophy of Education course examines the nature of educational philosophy and its relation to religion, education and culture. Human nature as an educator (inner creative thinking). Schools of Philosophy of Education and their implementation and implications in organizing education.

UNP1.60.3101 Entrepreneurship 3 Credits
This course contains knowledge, based on creative attitude and skills thinking and basic entrepreneurship, development models model innovative on the principles of entrepreneurship, strategy entrepreneurship, business ethics in entrepreneurship, opportunity analysis, business feasibility studies and business management (marketing, production, finance, resources, business legality, technology and information)

UNP1.61.4201 Guidance and Counseling 2 Credits
Guidance and Counseling is a compulsory university education course that provides insight and understanding of the basic concepts of BK, including; understanding, background, objectives, functions, principles, principles and code of conduct of BK, BK development fields, types of BK services, and BK protection activities as well as BK implementation operations in the implementation of the 2013 Curriculum. In addition, it also discusses the role of the Principal, Deputy Principal, subject teachers, homeroom teachers, BK teachers or counselors and other personnel as well as BK supervisors in BK services at schools.

UNP1.61.5101 Field Experience Program 1 (PPL1) 1 Credit
provide experience for students to observe and how teachers plan to implement learning using various educational media media

UNP1.60.5401 Real Work Lecture (KKN) 2 Credits
Real Work Lecture (KKN) is a field activity for students who are taking the final part of the S-1/D4/Applied Bachelor education program. This program is actually mandatory for all 2018 FMIPA Academic Manual

UNP1.61.6401 Field Experience Program 2 (PPL 2) 1 SKS
Provide experience for students to make observations on the attitudes and ways of teachers planning and carrying out assessments and evaluations

UNP1.61.7401 Field Experience Program 3 (PPL 3) 3 Credits
Provide real experience for students to practice teaching and other school activities for one semester

UNP2.60.1401 Basic Natural Sciences 2 Credits
This course contains the nature and scope of the human mind and its development, the development of science, the earth and the universe, the diversity of living things and their distribution, living things in natural ecosystems, natural resources and the environment, the benefits and impacts of science and technology on social life, history, human civilization and technological developments, some important technological developments, and environmental issues

UNP2.60.1402 Basic Socio-Cultural Sciences 2 Credits
This course contains: Basic concepts in social and cultural sciences to study Indonesian society and changes in Indonesian society and culture. The subjects are humans and human culture as individuals and human social beings, moral values and human law, human diversity and equality, science technology and human arts and the environment.

UNP2.60.2101 Physical Fitness Education 2 Credits
This course applies the effects and benefits of various movement activities for physical fitness and health through various games, competitions, and sports exercises and abilities.

2018 FMIPA Academic Manual
analyze importance activity physical for maintain and develop the body's physiological functions and health and can be applied throughout life.

UNP2.60.2102 Japanese 2 Credits
Japanese language courses equip students with knowledge about Japanese language practice so that students have the ability to read and communicate using Japanese.

UNP2.60.2103 Multicultural Education 2 Credits
This multicultural education course contains the concept of multicultural education: the urgency of multicultural education in a diverse Indonesian society, building an inclusive diversity paradigm through educational institutions. prospects and constraints of multicultural implementation, implementation of multicultural education in Indonesia, as well as character building of students through the application of multicultural ideology in the field of education.

UNP2.60.2401 History of the Struggle of the Indonesian Nation 2 Credits
The History of the Nation's Struggle course discusses the meaning and historical meaning of the nation's struggle, imperialism and colonialism, the struggle of the Indonesian nation against imperialism and colonialism, the Indonesian national movement, the struggle for independence, the meaning of the proclamation of efforts to maintain independence against various threats that threaten the unitary state of the Republic of Indonesia, the Republic of Indonesia.

UNP2.60.2402 Disaster Management 2 Credits
This course refers to Law No. 24 of 2007 on Disaster Management (Disaster Management) which includes the introduction of facts or evidence of disaster events, introduction of the concept of disaster, types of disasters, characteristics of disasters, natural disasters, non-natural disasters, disasters social, vulnerable, disaster / hazard (hazard), potential hazard, vulnerability, (vulnerability), capacity, principle of risk reduction (risk), prevention, mitigation, preparedness, disaster prediction, disaster impact, disaster response procedures and emergency response, analysis of rehabilitation and reconstruction needs.

UNP2.60.3401 MinangKabau Natural Culture 2 Credits
This course contains material on Minangkabau customs, both objective and subjective, through the study of objective and subjective customs, students are expected to be able to understand the identity of Minangkabau people and be able to find the values of progress contained in adat that are relevant to the challenges of 21st century competence, namely multiculturalism, cooperation, problem solving and so on.

UNP2.60.3402 Information and Communication Technology 2 Credits
This course learns about information and communication technology that can make daily work easier. Understanding usage “Office Applications” software, Internet Technology, Device usage learning animation development software, technology development and application use in education and being able to recognize internet-based business.

FMA1.60.1301 General Biology 4 Credit Points
This course discusses the knowledge of living things and scientific methods, cells as the basis of life, metabolism, structure and organization of plant and animal bodies, biodiversity, structure, functions and processes in human organ systems, ecology, genetics and evolution and biotechnology.

FMA1.60.1302 Calculus 4 Credits
This course discusses the real number system, equations and inequalities, absolute values and absolute inequalities, coordinate systems and simple graphs, functions, limits and continuity, derivatives, related rates, graphs, and integrals.

FMA1.60.1304 General Chemistry 4 Credit Points
This course discusses Stoichiometry, Chemical Energetics, Atomic Structure, Periodic System of Elements, Chemical Bonds and Molecular Geometry, Forms of Matter and Chemical Equilibrium.

FMA1.60.2104 General Physics 4 Credits
This course discusses quantities and units, particle kinematics, particle dynamics, work and energy, linear momentum, angular momentum and rigid bodies, static fluids, dynamic fluids, concepts of temperature and heat, and the laws of thermodynamics.

KIM1.61.2103 Basic chemistry 4 credits
This course discusses solution chemistry, colloids, chemical kinetics, redox and electrochemistry, elemental chemistry (hydrogen, oxygen, nitrogen, phosphorus, halogens,
noble gases, alkali metals, alkaline earth metals, transition groups), nuclear chemistry and radiochemistry, organic compounds, biochemistry and lab work.

KIM1.61.2104 English for Chemistry 2 Credits
Discussing reading and pronunciation, grammar, vocabulary and idioms in chemistry textbooks

KIM1.61.2105 Mathematics Chemistry 2 Credits
This course discusses mathematical concepts related to chemical problems, namely: function graphs, spatial geometry and trigonometry, differentials, integrals, differential equations, coordinate systems, matrices and determinants, complex numbers and operators.

KIM1.61.3101 Chemical Physics 1 4 Credit Points
This course explains gas equations of state, thermodynamic variables, first law, thermochemistry, second law, third law, material equilibrium, phase one and multicomponent equilibrium. solutions, chemical equilibrium in gases and non-electrolyte solutions, ionic equilibrium, surface chemistry and electrochemistry and practical work on these topics.

KIM1.61.3102 Organic Chemistry 1 4 Credits
This course discusses; definition of carbon compounds, analysis of compounds and molecular formulas hybridization of sp3, sp2 and sp carbon atoms, determine the forms of hybrid orbitals, formation of covalent bonds, sigma bonds and pi bonds, bond angles, introduction of organic compounds, saturated and unsaturated hydrocarbons, alkanes, cycloalkanes, alkenes, alkynes and aromatics, organic compounds with single functional groups (aliphatic and aromatic), hydroxy compounds, halides, carboxyls, carboxylic acids and their derivatives as well as practical work on these topics

KIM1.61.3103 Analytical Chemistry 1 4 Credit Points
Qualitative analysis includes cation recognition and group separation reactions. Gravimetry includes depositional and volatilization methods. Titrimetry (Volumetry) includes several terminology, neutralization titration, precipitation titration, complexometry, redox titration. The steps of chemical analysis include problem identification, method selection, sampling, sample application, measurement, data processing and conclusion drawing

KIM1.61.3104 Structure of Inorganic Compounds 4 Credits
Discusses the structure of Inorganic compounds, including: (1) Atomic Structure: development of atomic theory, especially the wave mechanics atomic model and the electron configuration of elements. (2) A brief overview of the periodic table of elements and their relation to some of the important periodic properties of the elements (metal/electropositive properties, non-metal/electronegative properties, atomic size, ionization potential, electron affinity, electronegativity); concepts of chemical bonds and electronegativity, especially Pauling’s concept of the relationship between bond energies and electronegativity differences. (3) Ionic compounds: the formation of ionic compounds, the use of the Born-Haber circle. Stability of ionic compounds based on lattice energy and heat of formation, role and size of ionic radii, properties of ionic compounds (hardness, non-polar character, boiling point, melting point). (4) Molecular structure: formation of covalent compounds based on: valence bond theory (VBT), hybridization and VSEPR theory, molecular orbital theory (MOT); Complex compounds: bond formation, structure, nomenclature, bond theory in complex compounds: VBT (valence bond theory), CFT (crystal field theory).

KIM1.61.3201 School Chemistry 1 3 Credits
Discussed about: Development of indicators and learning objectives based on KD, concept analysis, and problem analysis for class X material, namely the nature of chemistry, scientific methods, safety and security of work in the laboratory, and the role of chemistry in life; atomic structure, electron configuration relationships in the periodic table of elements; similarity of elemental properties and periodicity of elements; chemical bonds, molecular shape, and intermolecular interactions; molecular shape; interactions between particles; electrolyte and nonelectrolyte solutions; Oxidation and reduction reactions and nomenclature of compounds; Basic laws of chemistry and stoichiometry

KIM1.61.3202 Chemistry Lesson Planning 3 Credits
Analyzing the curriculum, formulating indicators and learning objectives, Determining Teaching Methods and Media, compiling evaluations, compiling RPP and SP according to the teaching planning model, implementing limited teaching in accordance with the teaching planning that has been prepared

KIM1.61.4201 School Chemistry 2 3 Credits
Discussed about: Development of indicators and learning objectives based on KD, concept analysis, and problem analysis for class XI material, namely hydrocarbon compounds; crude oil; combustion of hydrocarbons; thermochemistry, the rate of the reaction and the factors that influence it; rate law and determination of the rate of a reaction; chemical equilibrium and equilibrium shift, equilibrium shift and the factors that influence it; acid and base, ionic balance and pH of the salt solution; ionic and solution balance
buffer; titration; and colloidal systems.

**KIM1.61.4101 Chemistry learning evaluation 3 credits**
Discusses measurement, assessment, and basic principles of evaluation, techniques and instruments for assessing the learning process and techniques and evaluation instruments

**KIM1.61.4102 Chemical Physics 2 4 Credit Points**
Discusses: The kinetic theory of gases, properties of gas transport, Chemical kinetics, Reaction mechanisms, Effects of temperature on reaction rates, Catalysis, Photochemistry and practical work on the above topics

**KIM1.61.4103 Organic Kima 2 4 Credits**
This course discusses chemical formulas, nomenclature, manufacture, reactions, classification, chemical-physical properties, their presence, and the use of several organic compounds including esters, amides, amines, enolates, carbanions, dual-function acids, carbohydrates, lipids, Amino acids, peptides and proteins, alkaloids, flavonoids, steroids and terpenoids and practical work on the above topics

**KIM1.61.4104 Analytical Chemistry 2 4 Credits**
Learn about separation in chemical analysis including: distillation, extraction, chromatography including paper chromatography, thin layer, column chromatography, introduction to gas chromatography and HPLC, basics of electroanalysis include: indicator electrode, comparison electrode, potential meter and pH meter

**KIM1.61.4105 Fundamentals of Inorganic Reactions 4 Credits**
Discusses about inorganic reactions which include: Chemical forces, the basic principles of chemical reactions; bond energy, enthalpy and entropy, solubility of substances and the role of the medium in chemical reactions, acid-base systems: water ion systems, solvent systems, proton acceptor donor systems, electron pair acceptor donor systems, and proton affinities, redox and electrochemical systems: reaction relationships redox and acid-base reactions, inorganic reactions in aqueous and non-aqueous media, as well as practical work on some of the topics above

**KIM1.61.5201 School Chemistry 3 2 Credits**
Discusses about: Development of indicators and learning objectives based on KD, concept analysis, and problem analysis for class XII material, namely the colligative properties of solutions; colligative properties of electrolyte and nonelectrolyte solutions; cell
tercations; and colloidal systems.

**KIM1.61.5101 Learning Strategy 3 Credits**
This course discusses learning models, strategies, and methods and their application to chemistry learning

**KIM1.61.5102 Learning and IT Media 2 Credits**
Discussing learning media and IT applications in planning, making and using media

**KIM1.61.5103 Chemical Physics III 3 Credit Points**
This course discusses the theory of gas kinetics, chemical kinetics, complex reaction orders, consecutive reactions, reaction mechanisms and reaction rate theory, homogeneous, heterogeneous catalysts, acids and bases, enzymes and their implications in chemical reactions. Photochemistry: laws of photochemistry, intra and intermolecular processes, fluorescence and phosphorescence

**KIM1.61.5104 Organic Chemistry III 3 Credit Points**
Organic compounds with natural ingredients are terpenoids, steroids, phenyl, propane, polyketel hormones, xanthones and quinones, flavonoids and alkaloids. Changes in each group include the source of plants or organisms, the origin of biogenesis, specific reactions that reflect each group and the use of organic compounds from natural materials.

**KIM1.61.5105 Elemental Chemistry 3 Credit Points**
Discussing about the elements (history, existence, manufacture, properties, compounds, structure and uses) includes: s block elements; alkaline and alkaline earth elements, p block elements; boron group elements, carbon, nitrogen, oxygen, halogens and noble gases, d block elements; important transition elements, especially first series transition elements, f block elements; lanthanide and actinide elements

**KIM1.61.5106 Basic Biochemistry 3 Credits**
Discusses the basic principles of biochemistry, cell structure and function, water, amino acids, proteins, enzymes, carbohydrates, nucleic acids, lipids, vitamins, minerals, hormones, antibodies, antibiotics and transport through cell membranes as well as practicum on the above topics

2018 FMIPA Academic Manual
KIM1.61.6201 Micro teaching 2 credits
Discusses the basics of microteaching and the eight basic skills in teaching

KIM1.61.6202 School Chemistry Laboratory Management Skills 2 Credits
Discusses laboratory management and practicum implementation in schools, as well as discussions about planning laboratory activities for high school/MA chemistry materials

KIM1.61.6101 Educational Research Methodology 2 Credits
This course discusses how to find the truth of science, understanding research, problem selection, data collection, data analysis techniques, research proposals, use of references, developing theoretical frameworks, research and research reports.

KIM1.61.6102 Chemistry Seminar 2 Credits
Train to compose scientific concepts in writing and convey them in the forum orally. Identifying a problem and its approach, data collection techniques, data complications, and problem formulation. Techniques and strategies for conveying popular scientific communication data

KIM1.61.6302 Education Statistics 2 Credits
Discuss basic statistics and its application to educational research

KIM1.61.6303 Spectrophotometric Analysis 2 Credits
This course discusses the relationship of electromagnetic energy with molecules or atoms and Spectrophotometer methods and instruments.

KIM1.61.6304 Biochemistry Metabolism 3 Credits
Discusses digestion, metabolism in general (Carbohydrates, Proteins, Lipids), photosynthesis and genetic engineering, and practice the above topics

KIM1.61.7301 Thesis 6 Credits
Determination of the problem in the object of research; identification of problems within the scope of education in the field of chemistry, and selection of problems to be solved. Preparation of activity plans, sharpening problems, determining approach/problem solving method as well as research methodology, program formulation and activity implementation schedule. Preparation of activities; technical preparation (compilation of instruments, selection of tools/materials, etc.), administrative preparation (completion of permits, etc.), data processing and analysis. Presentation of theses or reports, printing and duplicating of theses/reports

KIM1.61.7302 Applied Chemistry 2 Credits
Practicing making shoe polish, making porcelain and ceramic cleaners, making charcoal briquettes, making solid, liquid and dab soap, making VCO, making nata, making tofu and tempeh, making soy milk, making soy sauce, making mosquito repellent, and making wet noodles. and making yogurt

KIM2.61.1101 Environmental Chemistry 2 Credits
This course studies the hydrological cycle, characteristics of water bodies, chemical reactions in the aquatic environment, heavy metal and refrigerant cycles, changes in species of chemical compounds in waters, water pollution, atmospheric composition, photochemical reactions in the atmosphere, ozone-depleting chain reactions, changes in compound species. chemistry in the atmosphere, basic knowledge of EIA, environmental quality standards, basic knowledge of wastewater treatment.

KIM2.61.1102 Computer application 2 Credits
Learn skills for operate computer and use it in the field of work, especially those related to education. Able to access the internet and understand about websites and email, able to use software for scientific writing, graphic design, and making learning media

KIM2.61.6301 Chemical Management and Entrepreneurship 2 Credits

KIM2.61.6101 Computer Applications 2 Credits
This course learns the skills to operate computers and use them in the field of work, especially those related to education. Able to access the internet and understand about websites and email, able to use software for scientific writing, graphic design, and making learning media
KIM2.61.6302 Molecular modeling 2 credits
This course studies the modeling of chemical systems, starting from modeling 3-dimensional structures based on x, y and z coordinates, calculating physical and chemical properties, predicting the biological activity of a compound, and predicting interactions that occur in a system.

KIM2.61.6303 Multirepresentation of chemistry 2 credits
This course studies how to represent chemistry at three levels; i.e. the level of macroscopic representation

KIM2.61.6304 Natural Materials Chemistry 2 Credits
This course studies organic compounds with natural ingredients such as terpenoids, steroids, phenyl, propane, polyketyl hormones, xanthones and quinones, flavonoids and alkaloids. Changes in each group include the source of plants or organisms, the origin of biogenesis, specific reactions that reflect each group and the use of organic compounds from natural materials.

KIM2.61.6305 Environmental Chemistry 2 Credits
This course studies the hydrological cycle, characteristics of water bodies, chemical reactions in the aquatic environment, heavy metal and refrigerant cycles, changes in species of chemical compounds in waters, water pollution, atmospheric composition, photochemical reactions in the atmosphere, ozone-depleting chain reactions, changes in compound species. chemistry in the atmosphere, basic knowledge of EIA, environmental quality standards, basic knowledge of wastewater treatment.

2. Chemistry Study Program (S1)
1. Vision.
   Becoming an excellent study program at the national level in 2020 based on devotion to God Almighty

   a. Carry out excellent education in the field of Chemistry based on faith and piety
   b. Carry out excellent research in the field of chemistry
   c. Improving the governance of study programs with excellent service in
   d. Carrying out community service that excels in the field of chemistry
   e. Carry out local, national and international cooperation

2. Destination
   a. Objectives To produce graduates as qualified members of society and actively participate in development.
   b. Collaborating with other universities, industry and chemistry study programs to produce Chemistry graduates who:
   c. Mastering chemistry material comprehensively, so as to be able to find, understand, explain and formulate methods solving problems in chemistry.
   d. Able to apply chemistry in the field of work, either directly or indirectly.
   e. Able to be entrepreneurial in the chemical field to create jobs.
   f. Able to follow the development of science and technology, especially chemistry and can apply it to the community.

3. Competence of graduates
   a. Main Competencies

      Field of Work Competence
      1. Able to produce appropriate conclusions based on the results of identification, analysis, isolation, transformation and synthesis of chemicals that have been carried out
      2. Able to solve science and technology problems in general and simple chemistry such as identification, analysis, isolation, transformation and synthesis of micromolecules through the application of knowledge of molecular structure and properties, analysis and synthesis methods in specific chemical fields, as well as the application of relevant technologies.
3. Able to present several alternative solutions in the field of identification, analysis, isolation, transformation and synthesis of chemicals at a simple molecular level that can be used as a basis for quick decision making

4. Mastering knowledge of structure, molecular properties, identification, separation, characterization, transformation, synthesis of micromolecular chemicals and their applications

5. Mastering knowledge of functions, how to operate common chemical instruments

Knowledge Mastery Competence
Mastering knowledge of structure, molecular properties, identification, separation, characterization, transformation, synthesis of micromolecular chemicals and their applications. Mastering knowledge of functions, how to operate common chemical instruments. Mastering the application of software, basic instruments, standard methods for analysis and synthesis in general or more specific chemistry fields (organic, biochemical, analytical, physical or inorganic chemistry)

b. Special Competencies
Field of Work Competence
1. Mastering the application of software, basic instruments, standard methods for analysis and synthesis in general or more specific chemistry fields (organic, biochemical, analytical, physical or inorganic chemistry)
2. Able to design procedures and setup practicum tools in the fields of chemistry, analysis and synthesis
3. Able to operate one of the chemical instruments such as XRF, AAS, HPLC, FTIR, GC-MS, HIC, DTA, UV-Vis Spectrophotometer to conduct advanced research
4. Able to apply chemistry in the field of chemical guidance for high school students
5. Mastering chemistry as the basis for continuing education in the Chemistry Masters program 5
6. Able to create jobs in the sale of tools and chemicals
7. Able to create jobs in the field of household chemical production such as making soap, syrup, nata, vco, soy sauce, noodles and others
8. Able to use computer in computational chemistry
9. Able to use English in daily life
10. Have a noble personality, good character and fear of God Almighty

4) Course Structure

Department : Chemistry
Program : Study : Chemistry (S1)

<table>
<thead>
<tr>
<th>No Code</th>
<th>Courses</th>
<th>credits</th>
<th>T</th>
<th>P</th>
<th>L</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Quantity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Required</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>UNP1.60.1401</td>
<td>Religious education</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>UNP1.60.1402</td>
<td>Pancasila Education</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>UNP1.60.1403</td>
<td>Education Citizenship</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>UNP1.60.1404</td>
<td>Indonesian</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>UNP1.60.1405</td>
<td>English</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>UNP1.60.3101</td>
<td>Entrepreneurship</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>UNP1.60.5401</td>
<td>Real Work Lecture (KKN)</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Number of Credits</td>
<td>16</td>
<td>14</td>
<td>0</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

B. Choose 2 of 18 Credits

<table>
<thead>
<tr>
<th>No Code</th>
<th>Courses</th>
<th>credits</th>
<th>T</th>
<th>P</th>
<th>L</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Quantity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>UNP2.60.1402Basic Natural Science</td>
<td>Socio-Cultural Sciences</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>UNP2.60.2402Basic Natural Science</td>
<td>Master Management</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Number of Credits</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

B. Choose 2 of 6 Credits

<table>
<thead>
<tr>
<th>No Code</th>
<th>Courses</th>
<th>credits</th>
<th>T</th>
<th>P</th>
<th>L</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Quantity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>UNP2.60.1401Basic Natural Science</td>
<td>Fitness Education Physical</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>UNP2.60.2101Basic Natural Science</td>
<td>Multicultural Education</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>UNP2.60.2101Japanese Language</td>
<td>History of the Nation's Struggle Indonesia</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>UNP2.60.3401Natural Culture MinangKabau</td>
<td>Information Technology and Communication</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Number of Credits</td>
<td>14</td>
<td>12</td>
<td>2</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 3. Faculty Compulsory Courses

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>credits</th>
<th>T</th>
<th>PL</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>FMA1.60.1301</td>
<td>General biology</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>FMA1.60.1302</td>
<td>Calculus</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>FMA1.60.1303</td>
<td>General Physics</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>FMA1.60.1304</td>
<td>General Chemistry</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Number of Credits</strong></td>
<td><strong>16</strong></td>
<td><strong>12</strong></td>
<td><strong>4</strong></td>
<td><strong>0</strong></td>
</tr>
</tbody>
</table>

### 4. Study Program Compulsory Courses

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>credits</th>
<th>T</th>
<th>PL</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>KIM1.62.1001</td>
<td>Management and work safety laboratory</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>KIM1.62.2001</td>
<td>Chemistry Math</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>KIM1.62.2002</td>
<td>Statistics</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>KIM1.62.2004</td>
<td>basic chemistry</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>KIM1.62.2005</td>
<td>English for chemistry</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>KIM1.62.3001</td>
<td>Organic chemistry 1</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>KIM1.62.3002</td>
<td>Physical Chemistry 1</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>KIM1.62.3003</td>
<td>Analytical chemistry 1</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>KIM1.62.3004</td>
<td>Structure of Inorganic Compounds</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>KIM1.62.4001</td>
<td>Organic Chemistry 2</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>11</td>
<td>KIM1.62.4002</td>
<td>Analytical Chemistry 2</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>12</td>
<td>KIM1.62.4003</td>
<td>Chemical Physics 2</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>13</td>
<td>KIM1.62.4004</td>
<td>Basic Inorganic Reaction</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>14</td>
<td>KIM1.62.4005</td>
<td>Chemical industry</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>15</td>
<td>KIM1.62.5001</td>
<td>Physical Chemistry 3</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>16</td>
<td>KIM1.62.5002</td>
<td>Basic Biochemistry</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>17</td>
<td>KIM1.62.5003</td>
<td>Organic Chemistry 3</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>18</td>
<td>KIM1.62.5004</td>
<td>Elemental Chemistry</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Number of Credits</strong></td>
<td><strong>16</strong></td>
<td><strong>12</strong></td>
<td><strong>4</strong></td>
<td><strong>0</strong></td>
</tr>
</tbody>
</table>

### 5. Study Program Elective Courses

#### 5.1. Choose 2 of 6 Credits

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>credits</th>
<th>T</th>
<th>PL</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>KIM2.62.4001</td>
<td>Computer application</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>KIM2.62.4002</td>
<td>Chemical modeling</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>KIM2.62.4003</td>
<td>Multi Representation of Chemistry</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Number of Credits</strong></td>
<td><strong>6</strong></td>
<td><strong>4</strong></td>
<td><strong>2</strong></td>
<td><strong>0</strong></td>
</tr>
</tbody>
</table>

#### 5.2. Choose min 8 credits, 6 credits in the field group research

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>credits</th>
<th>T</th>
<th>PL</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>KIM2.62.5001</td>
<td>Polymer Physics Chemistry 2</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>KIM2.62.5002</td>
<td>Colloidal and surface chemistry</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

---

2018 FMIPA Academic Manual
<table>
<thead>
<tr>
<th>No.</th>
<th>Code</th>
<th>Courses</th>
<th>credits</th>
<th>T</th>
<th>PL</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>KIM2.62.5003</td>
<td>Surface physics chemistry</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>KIM2.62.5004</td>
<td>Capita Seleka of Physical Chemistry</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>KIM2.62.5005</td>
<td>Inorganic polymer chemistry Capita</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>KIM2.62.5006</td>
<td>seleka of organic chemistry Capita</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>KIM2.62.5007</td>
<td>seleka of biochemistry</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>KIM2.62.5008</td>
<td>Capita selecta analytical chemistry</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>KIM2.62.5009</td>
<td>Capita selecta chemistry inorganic</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>KIM2.62.6001</td>
<td>Food Biochemistry</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>KIM2.62.6002</td>
<td>Coordination Chemistry</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>KIM2.62.6003</td>
<td>Material Chemistry</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>13</td>
<td>KIM2.62.6004</td>
<td>Surfactant Chemistry</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>14</td>
<td>KIM2.62.6005</td>
<td>Chemical Thermodynamics</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>15</td>
<td>KIM2.62.6006</td>
<td>Metal organo</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>16</td>
<td>KIM2.62.6007</td>
<td>Organic polymer chemistry</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>17</td>
<td>KIM2.62.6008</td>
<td>Nanotechnology</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>18</td>
<td>KIM2.62.6009</td>
<td>Enzymology</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>19</td>
<td>KIM2.62.6010</td>
<td>Synthetic organic chemistry</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>20</td>
<td>KIM2.62.6011</td>
<td>Modern chromatographic techniques</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>21</td>
<td>KIM2.62.6012</td>
<td>Applied analysis</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>22</td>
<td>KIM2.62.6013</td>
<td>Preconcentration Technique</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>23</td>
<td>KIM2.62.6014</td>
<td>Catalyst chemistry</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>24</td>
<td>KIM2.62.6015</td>
<td>Membrane technology</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>25</td>
<td>KIM2.62.6016</td>
<td>Inorganic Synthesis</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>26</td>
<td>KIM2.62.6017</td>
<td>Fuel Cell</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>27</td>
<td>KIM2.62.6018</td>
<td>Medical biochemistry</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>28</td>
<td>KIM2.62.7001</td>
<td>Natural Chemicals</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>29</td>
<td>KIM2.62.7002</td>
<td>Solid Substance Chemistry</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>30</td>
<td>KIM2.62.7003</td>
<td>Chemical Kinetics</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Synopsis

**UNP1.60.1401 Religious Education 3 Credits**

The One and Only Godhead: faith and piety, divine philosophy (Theology); Humans: human nature, human dignity, human responsibility; Law: raise awareness to obey God's law, the prophetic function of religion in law: Moral: religion as a source of morals, your character in life; Science, Technology and Arts: Faith, science and technology, and society as a unit, the obligation to demand and practice knowledge, the responsibility of scientists and artists; inter-religious harmony: religion is God's grace for all, togetherness in religious plurality; Civilized and prosperous society, the role of religious communities in creating a civilized and prosperous society, Human Rights (HAM) and democracy Culture: academic culture, work ethic, open and fair attitude; Politics: the contribution of religious adherents in political life.

**UNP1.60.1402 Pancasila Education 2 Credits**

This course contains the understanding of the urgency and reasons for the need for Pancasila education in Higher Education; Pancasila in the current history of Indonesia; Pancasila as a philosophical system, as the state foundation of the Republic of Indonesia, as a state ideology, as an ethical system, and Pancasila as the basis for the value of developing science; The thinking and implementation of Pancasila faces current actual problems, such as issues of human rights, racial and economic criticism, as well as problems of radicalism that must be solved in accordance with the values of Pancasila.
UNP1.60.1403 Citizenship Education 2 Credits
This course contains the nature of civic education in developing full undergraduate or professional abilities; the essence and urgency of national identity as one of the determinants of nation building and character, the urgency of national integrity and national unity; constitutional values and norms of the 1945 Constitution of the Republic of Indonesia and the constitutional provisions of the legislation under the Constitution; harmony of obligations and rights of the state and citizens in a democracy that is based on people's sovereignty and deliberation for consensus; the nature, instrumentation, and practice of Indonesian democracy based on Pancasila and the 1945 Constitution of the Republic of Indonesia; constitutional historical dynamics, socio-political culture,

UNP1.60.1404 Indonesian 2 Credits
This course contains the Conception of Indonesian Language, History of Indonesian Language, Position and Functions of Indonesian Language, Indonesian Language Spelling Variations, (punctuation letters, words and absorption elements: Effective Sentences, Definition of Characteristics, Terms of Effective Sentences: Paragraphs, Types, Functions and Development: Writing Framework Theme, Topic, Title and Type of Outline: Writing Text (Scientific Academic Text and Non-Academic Text: BI Official Letter (Format and Type of Indonesian Official Letter.

UNP1.60.1405 English 2 Credits
This course contains the development of English language skills in an integrated manner by paying attention to the needs of students according to the midwife of their department, including understanding basic sentence patterns that help students understand various English references and equip students with communication skills in English according to their field of expertise.

UNP1.60.3101 Entrepreneurship 3 Credits
This course contains knowledge, attitudes and skills based on creative and innovative thinking regarding the basic principles of entrepreneurship, entrepreneurial development models, entrepreneurial strategies

UNP1.60.5401 Real Work Lecture (KKN) 2 Credits
The Real Work Lecture (KKN) is a field activity for students who are taking the final part of the S-1/D 4/Applied Bachelor's education program. This program is actually mandatory for all students, because the university believes that this program can encourage student empathy, and can contribute to solving problems that exist in society. Community service activities are a tangible form of the university's contribution to the community, industry, local government and community groups who want to be economically and socially independent. This KKN program requires Field Supervisors (DPL) and students to play an active role in knowing the existing problems, even before they plunge for 1 to 2.5 months in the middle Public. Concept "working with community" have replace concept "working for the community".

UNP2.60.1401 Basic Natural Sciences 2 Credits
This course contains the nature and scope of the human mind its development, the development of science, the earth and the universe, the diversity of living things and their distribution, living things in natural ecosystems, natural resources and the environment, the benefits and impacts of science and technology on social life, the history of human civilization and technological developments, several important technological developments, and issues environment

UNP2.60.1402 Basic Socio-Cultural Sciences 2 Credits
This course contains: Basic concepts in social and cultural sciences to study Indonesian society and changes in Indonesian society and culture. The subjects are humans and human culture as individuals and human social beings, moral values and human law, human diversity and equality, science, technology and human arts and the environment.

UNP2.60.2101 Physical Fitness Education 2 Credits
This course applies the effects and benefits of various movement activities for physical fitness and health through various activities
kinds of games, competitions, and sports exercises as well as the ability to analyze the importance of physical activity to maintain and develop physiological functions of the body and health and can be applied throughout life.

**UNP2.60.2102 Japanese 2 Credits**
Japanese language courses equip students with knowledge about Japanese language practice so that students have the ability to read and communicate using Japanese.

**UNP2.60.2103 Multicultural Education 2 Credits**
This multicultural education course contains the concept of multicultural education: the urgency of multicultural education in a diverse Indonesian society, building an inclusive diversity paradigm through educational institutions, prospects and constraints of multicultural implementation, implementation of multicultural education in Indonesia, and character building of students through the application of multicultural ideology in the field of education.

**UNP2.60.2401 History of the Struggle of the Indonesian Nation 2 Credits**
The History of the Nation’s Struggle course discusses the meaning and historical meaning of the nation’s struggle, imperialism and colonialism, the struggle of the Indonesian nation against imperialism and colonialism, the Indonesian national movement, the struggle for independence, the meaning of the proclamation of the effort to defend independence against various threats that threaten the unitary state of the Republic of Indonesia, NKRI

**UNP2.60.2402 Disaster Management 2 Credits**
This course refers to Law No. 24 of 2007 concerning Disaster Management, which includes the introduction of facts or evidence of disaster events, introduction to the concept of disaster, types of disaster characteristic of disasters, natural disasters, non-natural disasters, social disasters, disaster swamps/hazards (hazards), potential hazards, vulnerability, capacity, principles of risk reduction (risk prevention, mitigation, preparedness, disaster prediction, disaster impact, disaster response procedures and emergency response, analysis of rehabilitation needs and reconstruction.

**UNP2.60.3401 MinangKabau Natural Culture 2 Credits**
This course contains material on Minangkabau customs, both object and subjective. Through the study of objective and subjective customs, students are expected to be able to understand Minangkabau human identity and be able to discover the values of progress contained in adat that are relevant to the challenges of 21st century competence, namely multiculturalism, problem solving cooperation and so on.

**UNP2.60.3402 Information and Communication Technology 2 Credits**
This course learns about information and communication technology that can make daily work easier. Understanding device usage “Office Applications” software, Internet Technology, Software usage development of learning animations, development of technology and use of applications in the field of education as well as being able to recognize internet-based business.

**FMA1.60.1301 General Biology 4 Credit Points**
This course discusses knowledge of living things and scientific methods, cells as the basis of life, metabolism, structure and organization of plant and animal bodies, biodiversity, structure, functions and processes in human organ systems, ecology, genetics and evolution as well as biotechnology.

**FMA1.60.1302 Calculus 4 Credits**
This course discusses the real number system, equations and inequalities, absolute values and absolute inequalities, coordinate systems and simple graphs, functions, limits and continuity, derivatives, related rates, graphs and integrals.

**FMA1.60.1303 General Physics 4 Credit Points**
This course discusses quantities and units, particle dynamics of particle kinematics, work and energy, linear momentum, angular momentum and rigid bodies, static fluids, dynamic fluids, concepts of temperature and heat, and the laws of thermodynamics.

**FMA1.60.1304 General Chemistry 4 Credit Points**
This course discusses Stoichiometry, Chemical Energetics, Atomic Structure, Periodic System of Elements, Chemical Bonds and Molecular Geometry, Z Form and Chemical Equilibrium.
KIM1.62.1001 Laboratory work management and safety 2 credits
This course must be followed by new students as a provision in carrying out practicum in the laboratory

KIM1.62.2001 Mathematics Chemistry 2 Credits
This course discusses mathematical concepts related to chemistry problems, namely: graphs of functions, space geometry and differential trigonometry, integrals, differential equations, coordinate systems, matrices and determinants, complex numbers and operators

KIM1.62.2002 Statistics 2 Credits
This course studies statistics which are useful in learning chemistry

KIM1.62.2004 basic chemistry 4 credits
This course discusses solution chemistry, colloids, chemical kinetics, redo and electrochemistry, elemental chemistry (hydrogen, oxygen, nitrogen, phosphorus, halogens, noble g, alkali metals, alkaline earth metals, transition groups), nuclear chemistry and chemical rad, organic compounds, biochemistry and practicum

KIM1.62.2005 English for chemistry 2 credits
Improve English language skills through reading and pronunciation exercises, improve grammar, enrich vocabulary and use idioms and usage, especially chemistry textbooks

KIM1.62.3001 Organic chemistry 1 4 credits
This course discusses; understanding of carbon compounds, analysis of compounds and molecular formulas hybridization of sp3, sp2 and sp carbon atoms, determining the form of hybrid orbitals, formation of covalent bonds, sigma bonds and bond angle pH bonds, introduction of organic compounds, saturated and unsaturated hydrocarbons alkanes, cycloalkanes, alkenes, alkynes and aromatics, single-function organic compounds (aliphatic and aromatic), hydroxy compounds, halides, carbonyls, carboxylic acids and their derivatives

KIM1.62.3002 Chemical Physics 1 4 Credit Points
Explain the equations of state of gases, thermodynamic variables, first law

thermochemistry, second law, third law, single and multicomponent phase equilibrium of matter. solution, chemical equilibrium in gas and non-electrolyte solutions, ionic equilibrium, surface chemistry and electrochemistry.

KIM1.62.3003 Analytical chemistry 1 4 Credit Points
The steps of chemical analysis include problem identification, method selection, sampling, sample application, measurement, processing and conclusion. Qualitative analysis includes cation-loving reactions and group separation. Gravimetry includes deposition and volatilization methods. Titrimetry (Volumetry) includes several terminology, neutralization titration, precipitation titration, complexometry, redox titration.

KIM1.62.3004 Structure of Inorganic Compounds 4 Credits
Discusses the structure of inorganic compounds, including: Atomic structure, development of atomic theory, especially atomic models, wave mechanics, and elemental electron configurations. A brief overview of the periodic table of elements and their relation to some of the important periodic properties of the elements (metal/electropositive shift, non-metal/electronegative properties, atomic size, ionization potential, electron affinity, electronegativity); concepts of chemical bonding and electronegativity, especially Pauling's concept of the relationship between bond energies and electronegativity differences. Ionic compounds: formation of ionic compounds using the Born-Haber circle. The stability of ionic compounds is based on ki energy and heat of formation, the role and size of ionic radii, properties of ionic compounds (hardness, non-polar character, boiling point, melting point). The molecular structure of the formation of covalent compounds is based on:

KIM1.62.4001 Organic Chemistry 2 4 Credits
This course learns about chemical formulas, nomenclature, making reactions, classification, chemical-physical properties, their presence, and the use of several organic compounds including esters, amides, amines, enolates, carbanions, dual-functional acids, carbohydrates, lipids, acids. Aminos, peptides and proteins, flavonoid alkaloids, steroids and terpenoids.
KIM1.62.4002 Analytical Chemistry 2 4 Credits
This course learns about separation in chemical analysis including distillation, extraction, chromatography including paper chromatography, thin layer column chromatography, introduction to gas chromatography and HPLC.

KIM1.62.4003 Chemical Physics 2 4 Credit Points
This course discusses: kinetic theory of gases, properties of gas transport, chemical kinetics, reaction mechanisms, effect of temperature on reaction rates, photochemical catalysts.

KIM1.62.4004 Basic Inorganic Reaction 4 Credits
This course discusses inorganic reactions which include: Chemical forces, the basic principles of chemical reactions; bond energy, enthalpy and entropy, solubility z and the role of the medium in chemical reactions, acid-base systems: ion systems a solvent systems, proton acceptor donor systems, electron pair acceptor donor systems, and proton affinities, redox and electrochemical systems: redox reactions relationships and acid-base reactions, inorganic reactions in aqueous medium and non-aqueous medium.

KIM1.62.4005 Industrial chemistry 2 Credits
This course discusses the application of various fields of chemistry in industry, such as cement, soap, coal, ceramics and others.

KIM1.62.5001 Physical Chemistry 3 3 Credit Points
This course studies the theory of gas kinetics, chemical kinetics, complex reaction orders, consecutive reactions, reaction mechanisms and reaction rate theory. Homogeneous, heterogeneous catalysts, acids and bases, enzymes and their implications in chemical reactions. Photochemistry: laws of photochemistry, intra and intramolecular processes, fluorescence, and phosphorescence.

KIM1.62.5002 Basic Biochemistry 4 Credits
This course discusses the basic principles of biochemistry, cell structure and function, water, amino acids, proteins, enzymes, carbohydrates, nucleic acids, lipids, vitamin minerals, hormones, antibodies, antibiotics and transport through cell membranes.

KIM1.62.5003 Organic Chemistry 3 3 Credits
This course studies intramolecular properties: bond dissociative energy, bond moment and dipole moment. Structural effects on molecular reactivity: inductive, mesomeric and steric effects. Types of reaction mechanisms and methods of determining non-kinetic and kinetic reaction mechanisms. Intermolecular properties include organic reactions, reaction mechanisms and factors that influence reactivity. Substitution reactions (SN, SE, SH) in aliphatic and aromatic systems, elimination reactions (E1, E2, Ei, E1cB), super reactions (electrophilic, nucleophilic and free radicals). The 1,2 da rearrangement reactions instead of 1,2 rearrangements in electron-deficient systems (shift to CN and O atoms), rearrangements in electron-rich systems. Oxidation-reduction reactions, general rules for the oxidation state of the C atom, as well as the mechanism of oxidation and reduction reactions.

KIM1.62.5004 Elemental Chemistry 4 Credit Points
This course studies the elements (history, existence, properties, compounds, structures and uses) including: s block elements; alkaline and alkaline earth elements, p block elements; boron group elements, carbon nitrogen, oxygen, halogens and noble gases, d block elements; important transition elements, especially the first series transition elements, f block elements; lanthanide and actinide elements.

KIM1.62.5005 Electrochemistry 4 Credit Points
This course studies electrochemical cell reactions, energy and potential, electrochemical instruments and their applications.

KIM1.62.5006 Industrial Visit 1 Credit
This course visits industry and research institutes of kim as well as campuses related to chemistry.

KIM1.62.6001 Metabolic biochemistry 4 Credits
This course discusses digestion, metabolism in general (Carbohydrates, Proteins, Lipids), photosynthesis and genetic engineering.

KIM1.62.6002 Instrument Analysis 1 3 Credits
Eye college this learn about various kinds of instrument spectrophotometry such as: UV-Vis, IR, MS, Raman, and NMR.
KIM1.62.6003 Environmental Chemistry 2 Credits
This course discusses the notion of the environment, the relationship between chemistry and the environment, environmental pollution, additives, and environmental toxicants.

KIM1.62.6004 Industrial Practice 2 Credits
This course requires students to carry out industrial-industrial field practice related to chemistry for 1 to 3 months.

KIM1.62.6005 Organic Chemistry Physics 2 Credits
Intramolecular properties: bond dissociation energy, bond moment and dipole moment. Structural effects on molecular reactivity: inductive, mesomeric and steric effects. Types of reaction mechanisms and methods of determining non-kinetic and kinetic reaction mechanisms. Intermolecular properties include organic reactions, reaction mechanisms and factors affecting reactivity Substitution reactions (SN1, SN2, SH) in aliphatic and aromatic systems, elimination reactions (E1, E2, Ei, E1cB), addition reactions (electrophilic, nucleophilic), and free radicals. The 1,2 rearrangement reactions instead of 1,2 rearrangements in the electron-deficient system (shift to C, N and O atoms), rearrangements in the electron-rich system. Oxidation-reduction reactions: general rules for the oxidation state of C atoms and the mechanism of oxidation and reduction reactions.

KIM1.62.6006 Core chemistry and radiochemistry 2 Credit Points
This course studies the structure of atoms, particles of matter, decay properties of nuclear models, nuclear reactions and their mechanisms, types of reactions in the interaction of radioactive radiation with matter, detection and measurement of nuclear energy radioactivity, radioisotope applications, and radiation chemistry.

KIM1.62.6007 Computational Chemistry 2 Credits
This course studies computer programming languages and how they are used in chemistry, both in education and research. In teaching chemistry is studying chemistry through the CD program. In kim to determine the reaction order, bond energy, bond length, structure and properties of compounds through the Calzaferi program, EHMO, and others.

KIM1.62.7001 Molecular structure analysis 2 Credits
This course studies the interpretation of data obtained through FTIR, GC, MS, UV-Vis and NMR analysis.

KIM1.62.7002 Instrument Analysis 2 3 Credits
This course studies the instruments used in chemical analysis such as XRD, XRF, DTG, DSC, DTA.

KIM1.62.7003 Bio Molecular Chemistry 3 Credits
This course studies genetic engineering including the expression of recombinant DNA, genetic material, DNA and RNA.

KIM1.62.7004 Chemical Research Methodology 2 Credits
This course studies the techniques of making research proposals.

KIM1.62.7005 Chemical Literature Seminar 2 Credits
This course teaches students seminars on chemical literature.

KIM1.62.7006 Applied Chemistry 2 Credits
This course studies the application of chemistry in everyday life.

KIM1.62.7007 Proposal Seminar 2 Credits
This course requires students to present a research proposal on a final project.

KIM1.62.8001 Seminar Results 1 Credit
This course requires students to present the results of their research.

KIM1.62.8002 Thesis Exam 3 Credits
In this course, students will be tested comprehensively on all the knowledge gained during college.

KIM2.62.4001 Computer Applications 2 Credits
This course learns the skills to operate computers and use them in the field of work, especially those related to midwives.
chemistry. Able to access the internet and understand about websites and email, able to use Microsoft Office materials, such as: MS Word, M Excel and MS Power Point, able to edit photos using Photoshop software, able to understand and create learning media in the form of interactive CDs using Macromedia Director and Flash.

KIM2.62.4002 Chemical modeling 2 Credits
This course studies how to describe chemical compounds through a computer.

KIM2.62.4003 Multi Representation Chemistry 2 Credits
This course teaches the multi-representation of chemistry.

KIM2.62.5001 Polymer Physics Chemistry 2 Credits
This course studies the synthesis and reactions of thermodynamic polymers and the kinetics of polymerization, physical characterization of polymerized polymers, testing and use of polymers. Organic polymers and their characteristics, polyphosphazenes, polysaxones and related polymers, and various other organic polymers. The polymer in solution will be related to lattice theories and molecular weight distribution, measurements of light skaterin, osmotic pressure and viscosity. Rheological, thermal, and core magnetic resonance (NMR) characterization of solid polymers.

KIM2.62.5002 Colloidal and surface chemistry 2 Credit Points
The scope of colloid and surface chemistry, sedimentation and fusion and their equilibrium, solution thermodynamics, osmotic and equilibrium Donna viscosity and aqueous dispersion, light skating, surface tension and contact contact, applications of pure solutions, adsorption of solutions, structure of colloids in surfactant solutions, adsorption physics at the solid-gas and liquid-liquid interfaces of metal surfaces, microscopy, spectroscopy, diffractometry, Van d Walls attraction and flocculation, electrophoresis, electrophoresis and other electrokinetic phenomena.

KIM2.62.5003 Surface physics chemistry 2 Credit Points
This course studies surface chemistry, surface analysis and reactions that occur on the surface.

KIM2.62.5004 Capita Selecta Chemical Physics 2 Credits
This course studies the theory and application of physical chemistry

KIM2.62.5005 Inorganic polymer chemistry 2 Credits
This course studies the chemistry of inorganic polymers and their applications

KIM2.62.5006 Capita selekta organic chemistry 2 Credit Points
This course studies biodiversity and floristic studies

KIM2.62.5007 Capita selekta biochemistry 2 Credits
This course studies toxicology and bioactivity.

KIM2.62.5008 Capita selekta analytical chemistry 2 Credits
This course studies about modified electrodes and liquid membranes

KIM2.62.5009 Capita selekta inorganic chemistry 2 Credit Points
This course discusses the synthesis and characterization of inorganic materials journals.

KIM2.62.6001 Food Biochemistry 2 Credits
This course studies the implementation of biochemistry in the food sector.

KIM2.62.6002 Coordination Chemistry 2 Credits
This course discusses coordination compounds: 1. Brief explanation of atomic orbitals, hybrid bonds involving d orbitals with ligand orbitals, and magnetic properties 2. Effect of ligand fields on splitting orbits d, octahedral field, tetrahedral field and planar quadrilateral field, the effect of ligand field on color, CFSE, absorption spectrum, spectrochemical series, Efe John â€” Teller 3. Orbital spherically averaging metrics, Orbital â€” orbital ? premises complex ion molecular orbitals, charge transfer 4. Environmental factors of concentration, metal ions, coordination groups, simple addition reactions, oxidation reduction substitutions, coordinated ligand reactions. 5. High spin, low spin keh coordination numbers, geometric isomers, optical isomers, coordination isomers ionization isomers. 6. Complex ion stability, stability constant, central ion charge, CFS
charge distribution, ligands, determination of stability constants, spectroscopy and electrochemistry. 7. Reaction rate, inert and labile complex, substitution reaction mechanism, SN1, SN2 process, octahedral substitution, quadrilateral substitution data on redox reaction mechanism.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>KIM2.62.6003</td>
<td>Material Chemistry 2 Credits</td>
<td>2</td>
</tr>
<tr>
<td>KIM2.62.6004</td>
<td>Surfactant Chemistry 2 Credits</td>
<td>2</td>
</tr>
<tr>
<td>KIM2.62.6005</td>
<td>Chemical Thermodynamics 2 Credit Points</td>
<td>2</td>
</tr>
<tr>
<td>KIM2.62.6006</td>
<td>Metal organo 2 Credits</td>
<td>2</td>
</tr>
<tr>
<td>KIM2.62.6007</td>
<td>Organic polymer chemistry 2 Credits</td>
<td>2</td>
</tr>
<tr>
<td>KIM2.62.6008</td>
<td>Nanotechnology 2 Credits</td>
<td>2</td>
</tr>
<tr>
<td>KIM2.62.6009</td>
<td>Enzymeology 2 Credits</td>
<td>2</td>
</tr>
<tr>
<td>KIM2.62.6010</td>
<td>Synthetic organic chemistry 2 credits</td>
<td>2</td>
</tr>
<tr>
<td>KIM2.62.6011</td>
<td>Modern chromatographic techniques 2 Credits</td>
<td>2</td>
</tr>
</tbody>
</table>

2018 FMIPA Academic Manual

KIM2.62.6012 Applied analysis 2 Credits
This course studies applied analysis

KIM2.62.6013 Preconcentration Technique 2 Credits
This course studies pre-concentration techniques

KIM2.62.6014 Catalyst chemistry 2 Credits
This course studies the chemistry of catalysts

KIM2.62.6015 Membrane technology 2 Credits
This course discusses membrane technology

KIM2.62.6016 Inorganic Synthesis 2 Credits
This course studies inorganic synthesis

KIM2.62.6017 Fuel Cell 2 Credits
This course studies fuel cells

KIM2.62.6018 Medical biochemistry 2 Credits
This course studies medical biochemistry

KIM2.62.7001 Chemistry of Natural Materials 2 Credits
This course studies organic compounds with natural ingredients such as steroids, phenyl, propane, polyketones, hormones, xanthones and quinones, flavonoids and alkaloids. Changes in each group include the source of plant growth or the origin of the biogenesis, specific reactions that reflect each group and the use of natural organic compounds.

KIM2.62.7002 Solid Substance Chemistry 2 Credits
This course studies the chemistry of inorganic and organic solids.

KIM2.62.7003 Chemical Kinetics 2 Credits
This course learns more about chemical kinetics

2018 FMIPA Academic Manual
3. Chemistry Education Study Program (S2)

1. Vision.
To become an Excellent Study Program that produces a Master of Chemistry Education with character and professionalism and is able to compete in the Southeast Asian region in 2025 based on faith and piety.

Based on the vision that has been set, the Mission of the Chemistry Education Master's Degree Study Program is:
1. Carry out superior innovations in chemistry learning.
2. Produce professional graduates who are superior and able to compete in regional and national areas.
3. Carrying out excellent research in the field of chemical education.
4. Develop superior community service in the form of collaboration with schools in improving the quality of chemistry learning.

3. Purpose
The objectives of the Masters Chemistry Education Study Program are:
1. Preparing students to become professional and characterized teaching staff.
2. To produce teachers and researchers in the field of chemical education who are reliable and highly dedicated berdedikasi - for secondary and higher education levels that are able to develop science, technology, art that are in line with the needs of the nation's development Indonesia.
3. Produce teaching staff with ability to identify related to problems that education, especially chemistry education, as well as being able to provide solutions-solutions to the problems found.
4. Become a leading education center in preparing experts
Chemistry Education through research, development, and dissemination of theories and principles of chemistry learning and chemistry.
5. As a vehicle to improve the quality of Indonesian human resources who have scientific and technological literacy.
6. Able to cooperate with various parties in improving the performance of education, research, and community service.
4. Competence of graduates

Main Competencies
The main competencies of graduates of S2 Chemistry Education are:
(a) have broad knowledge in the field of chemistry which includes organic chemistry, inorganic chemistry, biochemistry, physical chemistry, analytical chemistry, and basic sciences of chemistry;
(b) have the basic concepts of education, chemistry education and the teaching and learning process of chemistry;
(c) proficient in planning teaching programs based on the applicable curriculum;
(d) have competence in solving problems—problems encountered in the interaction of learning and laboratory management;
(e) flexible in choosing and developing learning methods and media needed in the learning process
(f) able to evaluate learning outcomes and carry out actions—follow-up actions as a result of the evaluation.

Supporting Competencies
Supporting competencies for graduates of S2 Chemistry Education are:
(a) have skills in computer science and the internet in the context of developing ICT-based learning media (Information Communication and Technology);
(b) able to seek information from various sources of information, both primary and secondary, searching via the internet, and textbooks, as well as being able to analyze and communicate the information obtained for teaching progress;
(c) mastering the use of information technology,
(d) able to behave in accordance with values and norms religion and develop student character.

5. Course Structure
Major: Chemistry
Study program: Chemistry Education (S2)

---

### 1). Mata Faculty Choice Lectures

#### A. Mandatory for S1 NK

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>FMA2.80.2301</td>
<td>Curriculum Development</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>FMA2.80.3301</td>
<td>Learning Design</td>
<td>2</td>
</tr>
</tbody>
</table>

#### Number of Credits: 4

---

### 2). Mata ta Study Program Compulsory Tuition

#### A. Mandatory

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>KIM1.82.1001</td>
<td>Educational Research</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>KIM1.82.1002</td>
<td>Methods Learning Strategies</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>KIM1.82.1003</td>
<td>Education Statistics</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>KIM1.82.1004</td>
<td>Biochemistry</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>KIM1.82.1005</td>
<td>Organic Chemistry</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>KIM1.82.1006</td>
<td>Analytical Chemistry</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>KIM1.82.2002</td>
<td>Information Technology-Based Learning Media</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>KIM1.82.2003</td>
<td>Inorganic Chemistry</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>KIM1.82.2004</td>
<td>Matter and Energy</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>KIM1.82.2005</td>
<td>Evaluation of Chemistry Learning</td>
<td>3</td>
</tr>
<tr>
<td>11</td>
<td>KIM1.82.2007</td>
<td>Proposal Seminar</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>KIM1.82.3001</td>
<td>Science Philosophy</td>
<td>2</td>
</tr>
<tr>
<td>13</td>
<td>KIM1.82.3002</td>
<td>Educational Science Foundation</td>
<td>3</td>
</tr>
<tr>
<td>14</td>
<td>KIM1.82.3003</td>
<td>for Physical Chemistry Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>15</td>
<td>KIM1.82.3004</td>
<td>Management</td>
<td>2</td>
</tr>
<tr>
<td>16</td>
<td>KIM1.82.4001</td>
<td>Results Seminar</td>
<td>1</td>
</tr>
<tr>
<td>17</td>
<td>KIM1.82.4002</td>
<td>Thesis Exam</td>
<td>4</td>
</tr>
</tbody>
</table>

#### Number of Credits: 38

---

### 3). Study Program Elective Courses

#### A. Choose 2 of 4 Credits

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>SKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>KIM2.82.3001</td>
<td>Capita Selecta Chemistry Education</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>KIM2.82.3002</td>
<td>Green Chemistry</td>
<td>2</td>
</tr>
</tbody>
</table>

#### Number of Credits: 4

---

### Synopsis

**FMA2.80.2301 Curriculum Development 2 Credits**

Many things related to the curriculum are generic in nature, which applies to all fields of study, levels, pathways and types of education. Therefore,
This course is designed to provide basic knowledge of curriculum that applies to all fields of study, levels and “settings” education. This consideration is based on the assumption that postgraduate students, especially in the field of education, need to master in general and thoroughly the various conceptions of the curriculum, the basics and principles of its development, as well as the implications for curriculum design, implementation of lectures from various available alternatives.

**FMA2.80.3301 Learning Design 2 Credits**
Discusses the basic concepts of instructional system design, learning needs, instructional analysis, formulation of instructional objectives, characteristics of students and the environment, learning activities, learning resources, learning management and the existence of evaluation in terms of learning design.

**KIM1.82.1001 Educational Research Methods 3 Credits**
This course studies the nature of scientific thinking, scientific methods and writing research proposals.

**KIM1.82.1002 Learning Strategy 3 Credits**
This course studies:
1. Learning and learning
2. Learning strategies
3. Learning theory
4. Constructivism in learning Inquiry in learning
5. Learning model
6. Contextual teaching learning

**KIM1.82.1003 Education Statistics 2 Credits**
This course studies
1. Definition and use of Distribution
2. statistics
3. Centering size
4. Dispersion size
5. inclination
6. Probability Theory

**KIM1.82.1004 Biochemistry 2 Credits**
This course studies
1. Micromolecule
2. Macromolecule
3. Metabolism of carbohydrates, lipids and amino acids
4. Photosynthesis
5. Molecular cloning genetic
6. Information flow
7. Biotechnology

**KIM1.82.1005 Organic Chemistry 2 Credits**
This course studies
1. Stereochemical organic
2. Reaction mechanism
3. Chirality and active optics
4. Reaction mechanism theory

**KIM1.82.1006 Analytical Chemistry 2 Credits**
This course studies
1. Qualitative analysis
2. Quantitative analysis
3. Chemical separation
4. Spectrophotometric analysis

**KIM1.82.2002 Information Technology-Based Learning Media 2 Credits**
This course studies
1. Introduction to internet and email management
2. Creating a chemistry learning website
3. Making media using powerpoint
4. Making media using interactive macromedia
5. Flash CD using Autorun enterprise

**KIM1.82.2003 Inorganic Chemistry 2 Credits**
This course studies
1. Fundamentals of inorganic chemistry
2. Development of atomic structure The periodicity of the elements
3. Chemical bonding model and theory

2018 FMIPA Academic Manual
5. Acid base theory
6. Chemical reactions
7. Characteristics of nonmetal compounds

**KIM1.82.2004 Matter and Energy 2 Credits**
This course studies
1. Atomic theory
2. Basic laws of chemistry
3. Chemical Bond
4. Chemical reaction stoichiometry

**KIM1.82.2005 Chemistry Learning Evaluation 3 Credits**
This course studies
1. The basic concept of educational evaluation
2. Assessment of the learning process
3. Evaluation in the preparation and implementation of learning outcomes tests
4. Analyzing questions
5. Authentic assessment

**KIM1.82.2007 Proposal Seminar 1 Credit**
This course studies about:
1. Relevant references
2. Chemistry education problems
3. Mode of presentation and scientific argumentation
4. Techniques for writing scientific papers

**KIM1.82.3001 Philosophy of Science 2 Credits**
This course studies
1. The concept of philosophy of science in ontology, epistemology, axiology
2. The concept of philosophy of science in scientific thinking
3. Philosophy of science in everyday life

**KIM1.82.3002 Educational Science Foundation 3 Credits**
This course studies
1. Socio-cultural background and educational philosophy
2. Relationship between socio-cultural life and education
3. Education in the process of socio-cultural change

**KIM1.82.3003 Laboratory Management 2 Credits**
This course studies
1. Laboratory Work Safety
2. Material handling
3. Dangerous experimental technique
4. Administration and arrangement of laboratory equipment
5. Making chemical kits

**KIM1.82.3004 Physical Chemistry 2 Credits**
This course studies
1. Thermodynamics
2. Thermochemistry
3. Equilibrium
4. Reaction kinetics

**KIM1.82.4001 Seminar Results 1 Credit**
This course studies
1. Actual problems in chemistry education
   Developing ideas to find solutions
   Developing research designs
   Research Implementation
   Presentation and presentation of research results

**KIM1.82.4002 Thesis Exam 4 Credits**
This course studies
1. Analysis of the results of scientific research; theses and articles
2. Presentation and Final Examination

**KIM2.82.3001 Capita Selecta Chemistry Education 2 Credits**
This course studies
1. Multiple representatives
2. Scientific approach
3. Learning models
4. High order thinking
5. Science Education

Study Program: Science Education

Vision, Mission, Goals, and Competencies of Study Program Graduates

a. Vision

Science Education Undergraduate Study Program “The Year 2028 as a Study Program who excel in Sumatra in the field of natural science and technology education characterized by local wisdom based on devotion to God Almighty

b. Mission

1. Organizing a quality Natural Science education process by utilizing various resources and technology in learning by taking into account the local wisdom of West Sumatra and Indonesia

2. Organizing research activities in the field of Science Education and disseminating the results at national and international levels.

3. Organizing community service activities as the implementation of education and research results for the advancement of the nation and local wisdom of West Sumatra

4. Improving the governance of study programs by involving all existing elements

5. Initiate and enhance local, national and international cooperation.

c. Destination

1. Ensuring the process and learning outcomes in the Science Education PSS are of quality according to quality standards, and utilizing technology in learning based on local wisdom in West Sumatra and Indonesia.

2. Produce research in the field of Science and Education Education spread result on level national nor international.

3. Well done service activities to society as the implementation of education and research results for the progress of the nation and maintaining the local wisdom of West Sumatra

4. The realization of improved governance of study programs by involving all elements at the university and faculty level
so that facilities and infrastructure are available and a conducive academic atmosphere is formed.
5. Established local, national, and international cooperation in the effort to develop the Science Education PSS

d. Competence
1. Attitude Competence
   Attitude competence is translated into several performances, namely as follows:
   a. Fear of God Almighty and able to show a religious attitude
   b. Upholding human values in carrying out duties based on religion, morals, and ethics
   c. Internalizing academic values, norms, and ethics
   d. Act as citizens who are proud and love their homeland, have nationalism and a sense of responsibility to the country and nation
   e. Appreciate the diversity of cultures, views, religions, and beliefs, as well as the opinions or original findings of others Contribute to
   f. Improving the quality of life in society, nation, state, and progress of civilization based on Pancasila Cooperate and have social sensitivity
   g. And concern for society and the environment
   h. Obey the law and discipline in social and state life dan
   i. Internalize the spirit of independence, struggle, and entrepreneurship
   j. Demonstrate an attitude of responsibility for work in their field of expertise independently and
   k. Have sincerity, commitment, sincerity to develop the attitudes, values, and abilities of students

2. Knowledge Competence
   Knowledge competence is described in the following points:
   a. Able to formulate learning objectives of Natural Sciences (IPA) in junior high schools according to curriculum objectives, and design, plan, and implement learning using a variety of approaches inquiries find answers through observation and/or experimentation) needed to achieve learning objectives and build skills
   critical thinking (critical thinking), problem solving (problem solving skills) as well as performance capabilities (performance skills)

b. Able to design and select appropriate activities, strategies, and learning resources to teach concepts and understanding of scientific processes and relationships and natural patterns through the empirical experience of junior high school students by:
   1) Considering the diversity of learning profiles, socio-cultural, emotional, intellectual, and physical aspects of students and fostering student learning motivation;
   2) Using relevant technology and/or laboratory activities (if required);
   3) Considering chemical safety factors and procedures and treatment ethics (ethical treatment) against living organisms inside or outside the classroom;

   c. Able to design and use authentic learning evaluation tools, techniques, and strategies both formal and informal (observations, student work portfolios, performance on assignments, projects, self-assessments, group assessments, and standardized tests) to evaluate student performance and learning progress (ideas, preconceptions, knowledge) continuously and effectively and interpret the results to modify strategies and improve learning science in junior high school in a sustainable manner;
   
   d. Able to build students' scientific literacy skills through the implementation of science learning;
   
   e. Able to conduct classroom research (classroom research) to evaluate the learning process, test methods, strategies, and learning resources and write the results in the form of studies as input for continuous improvement of science learning;

   f. Able to analyze various alternative solutions that exist for science learning problems and conclude them for appropriate decision making and if necessary involve the school community (parents, students, teachers, the community);

3. Supporting Competencies
   a. Able to apply logical, critical, systematic, and innovative thinking
   b. In the context of the development or implementation of science and technology that pays attention to and applies humanities values in accordance with their field of expertise;
   c. Able to demonstrate independent, quality, and measurable performance;
d. able to examine the implications of the development or implementation of science and technology that pays attention to and applies humanities values according to their expertise based on scientific principles, procedures and ethics in order to produce solutions, ideas, designs or art criticisms;

e. able to compile a scientific description of the results of the studies mentioned above in the form of a thesis or final project report, and upload it on the university's website;

f. able to make appropriate decisions in the context of solving problems in their area of expertise, based on the results of information and data analysis;

g. able to maintain and develop a network with supervisors, colleagues, colleagues both inside and outside the institution.

h. able to be responsible for the achievement of group work results and supervise and evaluate the completion of the work assigned to the workers under their responsibility.

i. able to carry out the process of self-evaluation of the work group under their responsibility, and able to manage learning independently

4. Other Competencies

a. Mastering theoretical concepts in the field of Natural Sciences (IPA), which consists of:

1) physics (measurement, mechanics, heat, vibration, sound waves, electricity, magnetism, optical systems and modern physics) and their application in biological systems

2) biology (diversity of living things, evolution, genes, cells, systems in living things, ecological relationships and interdependence)

3) chemistry (the concept of matter particles, atoms and periodic structures, chemical reactions, chemicals) and their application and influence in living systems;

4) the earth, solar system and the processes that occur in it the master the theoretical concepts of educational theory (pedagogy)

b. mastering theoretical concepts of developmental characteristics of learners

c. mastering theoretical concepts of curriculum, approaches, strategies, models, methods, techniques, teaching materials, media and learning resources for science education.

e. master complete operational knowledge about functions, how to operate common science instruments and analysis of data and information from these instruments; safety procedures, and work safety in the science laboratory.

f. Mastering knowledge about the function and use of technology, especially information and communication technology that is relevant to the development of the quality of science education.

1. Course Structure

Natural Science Education Study Program

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>credits</th>
<th>Total TPL</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1). Expertise Course (MKBK)

A. Mandatory

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>credits</th>
<th>Total TPL</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>FM1.60.1301</td>
<td>General biology</td>
<td>4</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>A050 Calculus</td>
<td></td>
<td>4</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Number of Credits 8.62

2). University Compulsory Courses

A. Mandatory

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>credits</th>
<th>Total TPL</th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UNP1.60.1401</td>
<td>Religious education</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>UNP1.60.1402</td>
<td>Pancasila Education</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>UNP1.60.1403</td>
<td>Civic education</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>UNP1.60.1404</td>
<td>Indonesian</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>UNP1.60.1405</td>
<td>English</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>UNP1.60.3101</td>
<td>Entrepreneurship</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>UNP1.60.5401</td>
<td>Real Work Lecture (KKN)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>UNP1.61.1201</td>
<td>Educational Science Fundamentals</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>UNP1.61.2011</td>
<td>Educational Psychology</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>UNP1.61.2102</td>
<td>Education Administration And Supervision</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>UNP1.61.2103</td>
<td>Philosophy of Education</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>UNP1.61.4201</td>
<td>Guidance and counseling</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>UNP1.61.6401</td>
<td>Field Experience Program 2 (PPL 2)</td>
<td>1</td>
<td>0 0 1 6 14</td>
<td>UNP1.61.7401</td>
</tr>
<tr>
<td></td>
<td>Field Experience Program 3 (PPL 3)</td>
<td>3 0 0 3 7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Number of Credits 32.28
<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>credits</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Sem</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>T</td>
<td>P</td>
<td>L</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3)</td>
<td>University Elective Courses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A. Choose 2 of 18 Credits</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>UNP2.60.1401Basic Natural Science</td>
<td></td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>T</td>
</tr>
<tr>
<td>2</td>
<td>UNP2.60.1402Basic Socio-Cultural Sciences</td>
<td></td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>T</td>
</tr>
<tr>
<td>3</td>
<td>UNP2.60.2101Physical Fitness Education</td>
<td></td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>T</td>
</tr>
<tr>
<td>4</td>
<td>UNP2.60.2102Japanese language</td>
<td></td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>T</td>
</tr>
<tr>
<td>5</td>
<td>UNP2.60.2103Multicultural Education</td>
<td></td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>T</td>
</tr>
<tr>
<td>6</td>
<td>UNP2.60.2401History of the Indonesian Nation’s Struggle</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>UNP2.60.2402Disaster Management</td>
<td></td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>T</td>
</tr>
<tr>
<td>8</td>
<td>UNP2.60.3401Natural Culture MinangKabau</td>
<td></td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>T</td>
</tr>
<tr>
<td>9</td>
<td>UNP2.60.3402Information and communication technology</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>3</td>
<td>T</td>
</tr>
<tr>
<td></td>
<td>Number of Credits</td>
<td></td>
<td></td>
<td>18</td>
<td>16</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>4)</td>
<td>Faculty Compulsory Courses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A. Mandatory</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>IPA1.60.1303General Physics</td>
<td></td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>IPA1.60.1304General Chemistry</td>
<td></td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>IPA1.60.2101Calculus</td>
<td></td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>T</td>
</tr>
<tr>
<td></td>
<td>Number of Credits</td>
<td></td>
<td></td>
<td>12</td>
<td>9</td>
<td>3</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>5)</td>
<td>Study Program Compulsory Courses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A. Choose 90 of 90 credits of compulsory study program</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>PA1.61.1301Education Statistics</td>
<td></td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>T</td>
</tr>
<tr>
<td>2</td>
<td>PA1.61.1401Basics of Environmental Science</td>
<td></td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>T</td>
</tr>
<tr>
<td>3</td>
<td>PA1.61.2301Mechanics Science</td>
<td></td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>T</td>
</tr>
<tr>
<td>4</td>
<td>PA1.61.2033Basics of organic chemistry ICT</td>
<td></td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>T</td>
</tr>
<tr>
<td>5</td>
<td>PA1.61.2304for Science Learning Diversity of</td>
<td></td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>T</td>
</tr>
<tr>
<td>6</td>
<td>PA1.61.2305Living Things Thermal Physics</td>
<td></td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>T</td>
</tr>
<tr>
<td>7</td>
<td>PA1.61.3301Fundamentals of Inorganic Chemistry</td>
<td></td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>T</td>
</tr>
<tr>
<td>8</td>
<td>PA1.61.3303in Earth Sciences and Astronomy</td>
<td></td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>T</td>
</tr>
<tr>
<td>9</td>
<td>PA1.61.3304Science Laboratory Management</td>
<td></td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>T</td>
</tr>
<tr>
<td>10</td>
<td>PA1.61.3305Science Media and Learning Resources</td>
<td></td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>T</td>
</tr>
<tr>
<td></td>
<td>Number of Credits</td>
<td></td>
<td></td>
<td>69</td>
<td>6</td>
<td>0</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>6)</td>
<td>Study Program Elective Courses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A. Choose 10 of the 20 credits of the study program’s elective courses.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>PA2.61.3301Capita Selecta IPA</td>
<td></td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>T</td>
</tr>
<tr>
<td>2</td>
<td>PA2.61.3401Conservation of Natural Materials and</td>
<td></td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>T</td>
</tr>
<tr>
<td>3</td>
<td>PA2.61.4301Energy Resources</td>
<td></td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>T</td>
</tr>
<tr>
<td>4</td>
<td>PA2.61.5301Physics Technology</td>
<td></td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>T</td>
</tr>
<tr>
<td>5</td>
<td>PA2.61.5302Applied Chemistry</td>
<td></td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>5</td>
<td>T</td>
</tr>
<tr>
<td>6</td>
<td>PA2.61.6301Redox and Electrochemistry</td>
<td></td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>5</td>
<td>T</td>
</tr>
</tbody>
</table>
develop full undergraduate or professional abilities; the essence and urgency of national identity as one of the determinants of nation building and character, the urgency of national integrity and national unity; the constitutional values and norms of the 1945 Constitution of the Republic of Indonesia and the constitutional provisions of the legislation under the Constitution; harmony of obligations and rights of the state and citizens in a democracy that is based on people's sovereignty and deliberation for consensus; the nature, instrumentation, and practice of Indonesian democracy based on Pancasila and the 1945 Constitution of the Republic of Indonesia; the historical dynamics of constitutional, socio-political, cultural, and contemporary contexts of sovereign law enforcement; the historical dynamics and the urgency of the insight into the archipelago as a collective conception and view of the Indonesian nationality in the context of world relations;

**UNP1.60.1404 Indonesian 2 Credits**
This course contains the Conception of Indonesian Language, History of Indonesian Language, Position and Functions of Indonesian Language, Indonesian Language Variety, Indonesian Spelling, (punctuation letters, words and absorption elements: Effective Sentences, Definition of Characteristics, Terms of Effective Sentences: Paragraphs Types, Functions and Developments: Writing Outline Theme, Topic, Title and Type of Outline: Writing Text (Scientific Academic Texts and Non-Academic Texts: BI Official Letters (Format and Types of Indonesian Official Letters.

**UNP1.60.1405 English 2 Credits**
This course contains the development of English language skills in an integrated manner by taking into account the needs of students according to their fields/majors, including understanding basic sentence patterns that help students understand various English references and equip students with communication skills in English according to their field of expertise.

**UNP1.61.1201 Fundamentals of Education 2 Credits**
Provide insight into human nature, the nature and importance of education, the foundations and principles of education, thoughts about education

**UNP1.61.2101 Educational Psychology 2 Credits**
This course examines/discusses the basic concepts of educational psychology, growth, student development, intelligence, talent, creativity, motivation, memory, individual differences and learning theories.

---

### Courses

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Courses</th>
<th>credits</th>
<th>PL</th>
<th>T</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>PA2.61.6302</td>
<td>Food Chemistry</td>
<td>2</td>
<td>11</td>
<td>1</td>
<td>05</td>
</tr>
<tr>
<td>8</td>
<td>PA2.61.6303</td>
<td>Applied Biology</td>
<td>2</td>
<td>11</td>
<td>1</td>
<td>05</td>
</tr>
<tr>
<td>9</td>
<td>PA2.61.7301</td>
<td>Applied Physics</td>
<td>2</td>
<td>11</td>
<td>1</td>
<td>07</td>
</tr>
<tr>
<td>10</td>
<td>PA2.61.7401</td>
<td>Science Entrepreneur</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>07</td>
</tr>
</tbody>
</table>

*Number of Credits: 30*

---

**Synopsis**

**UNP1.60.1401 Religious Education 3 Credits**
The One and Only Godhead: faith and piety, divine philosophy (Theology); Humans: human nature, human dignity, human responsibility; Law: raise awareness to obey God's law, the prophetic function of religion in law; Moral: religion as a source of morals, morals in life; Science, Technology and Arts: Faith, science and technology, and charity as a unit, the obligation to demand and practice knowledge, the responsibility of scientists and artists; Inter-religious harmony: religion is God's grace for all, togetherness in religious plurality; Society: civilized and prosperous society, the role of religious communities in realizing a civilized and prosperous society, human rights and democracy; Culture: academic culture, work ethic, open and fair attitude; Politics: the contribution of religious adherents to political life,

**UNP1.60.1402 Pancasila Education 2 Credits**
This course contains the meaning of urgency and reasons for the need for Pancasila education in Higher Education; Pancasila in the current history of the Indonesian nation; Pancasila as a philosophical system, as the basis of the state of the Republic of Indonesia, as a state ideology, as an ethical system, and Pancasila as the basis for the value of developing science; Thinking and implementing Pancasila in dealing with current actual problems, such as human rights, racial and economic problems, and the problem of radicalism that must be solved in accordance with the values of Pancasila.

**UNP1.60.1403 Citizenship Education 2 Credits**
This course contains the nature of citizenship education in
UNP1.61.2102 Administration and Education Supervision 2 Credits
Educational Administration and Supervision courses are courses that provide insight, basic concepts and processes as well as the scope of Educational Administration and Supervision and apply them in professional school management.

UNP1.61.2103 Philosophy of Education 2 Credits
The Philosophy of Education course examines the nature of educational philosophy and its relation to religion, education and culture. Human nature as an educator (inner creative thinking). Streams of Educational Philosophy and their implementation and implications in the administration of education.

UNP1.60.3101 Entrepreneurship 3 Credits
This course contains knowledge, attitudes and skills based on creative and innovative thinking regarding the basic principles of entrepreneurship, entrepreneurial development models, entrepreneurial strategies, business ethics in entrepreneurship, opportunity analysis, business feasibility studies and business management (marketing, production, finance), resources, business legality, technology and information.

UNP1.61.4201 Guidance and Counseling 2 Credits
Guidance and Counseling is a compulsory university education course that provides insight and understanding of the basic concepts of BK, including; understanding, background, objectives, functions, principles, principles and code of conduct of BK, BK development fields, types of BK services, and BK protection activities as well as BK implementation operations in the implementation of the 2013 Curriculum. In addition, it also discusses the role of the Principal, Deputy Principal, subject teachers, homeroom teachers, BK teachers or counselors and other personnel as well as BK supervisors in BK services at schools.

UNP1.60.5401 Real Work Lecture (KKN) 2 Credits
Real Work Lecture (KKN) is a field activity for students who are taking the final part of the S-1/D4/Applied Bachelor education program. This program is actually mandatory for all students, because the university believes that this program is able to encourage student empathy, and can contribute to solving problems that exist in society. Community service activities are a form of the real contribution of the university to the community, industry, local government and community groups who want to be economically and socially independent. This KKN program requires Field Supervisors (DPL) and students to play an active role in knowing the existing problems, even before they plunge for 1 to 2.5 months in the midst of the community. Concept “working with community” has replaced concept “working for the community”.

UNP1.61.6401 Field Experience Program 2 (PPL 2) 1 SKS
Provide experience for students to make observations on the attitudes and ways of teachers planning and carrying out assessments and evaluations.

UNP1.60.7401 Real Work Lecture (KKN) 2 Credits
Real Work Lecture (KKN) is a field activity for students who are taking the final part of the S-1/D4/Applied Bachelor education program. This program is actually mandatory for all students, because the university believes that this program is able to encourage student empathy, and can contribute to solving problems that exist in society. Community service activities are a tangible form of the university’s contribution to the community, industry, local government and community groups who want to be economically and socially independent. This KKN program requires Field Supervisors (DPL) and students to play an active role in knowing the existing problems, even before they plunge for 1 to 2.5 months in the midst of the community. Concept “working with community” has replaced concept “working for the community”.

UNP1.61.7401 Field Experience Program 3 (PPL 3) 3 Credits
Provide real experience for students to practice teaching and other school activities for one semester.

UNP2.60.1401 Basic Natural Sciences 2 Credits S
This course contains the nature and scope of the human mind and its development, the development of science, the earth and the universe, the diversity of living things and their distribution, living things in natural ecosystems, natural resources and the environment, the benefits and impacts of science and technology on social life, history, human civilization and technological developments, some important technological developments, and environmental issues.
**UNP2.60.1402 Basic Socio-Cultural Sciences 2 Credits**
This course contains: Basic concepts in social and cultural sciences to study Indonesian society and changes in Indonesian society and culture. The subjects are humans and human culture as individuals and human social beings, moral values and human law, human diversity and equality, science technology and human arts and the environment.

**UNP2.60.2101 Physical Fitness Education 2 Credits**
This course applies the effects and benefits of various movement activities for physical fitness and health through various games, competitions, and sports exercises as well as the ability to analyze the importance of physical activity to maintain and improve health.
Develop the body's physiological functions and health and can be applied throughout life.

**UNP2.60.2102 Japanese 2 Credits**
Japanese language courses equip students with knowledge about Japanese language practice so that students have the ability to read and communicate using Japanese.

**UNP2.60.2103 Multicultural Education 2 Credits**
This multicultural education course contains the concept of multicultural education: the urgency of multicultural education in a diverse Indonesian society, building an inclusive diversity paradigm through educational institutions. prospects and constraints of multicultural implementation, implementation of multicultural education in Indonesia, as well as character building of students through the application of multicultural ideology in the field of education.

**UNP2.60.2401 History of the Struggle of the Indonesian Nation 2 Credits**
The History of the Nation's Struggle course discusses the meaning and historical meaning of the nation's struggle, imperialism and colonialism, the struggle of the Indonesian nation against imperialism and colonialism, the Indonesian national movement, the struggle for independence, the meaning of the proclamation of efforts to maintain independence against various threats that threaten the unitary state of the Republic of Indonesia, the Republic of Indonesia.

**UNP2.60.2402 Disaster Management 2 Credits**
This course refers to Law No. 24 of 2007 concerning Disaster Management (Disaster Management) which includes the introduction of facts or evidence of disaster events, introduction to the concept of disaster, types of disasters, characteristics of disasters, natural disasters, non-natural disasters, social disasters, prone, disaster/hazard (hazard), potential hazard, vulnerability, (vulnerability), capacity (capacity), principle of risk reduction (risk), prevention, mitigation, preparedness, disaster prediction, disaster impact, disaster response procedures and emergency response, analysis of rehabilitation and reconstruction needs.

**UNP2.60.3401 MinangKabau Natural Culture 2 Credits**
This course contains material on Minangkabau customs, both objective and subjective. Through the study of objective and subjective customs, students are expected to be able to understand Minangkabau human identity and be able to find the values of progress contained in adat that are relevant to the challenges of 21st century competence, namely multiculturalism, cooperation, problem solving and so on.

**UNP2.60.3402 Information and Communication Technology 2 Credits**
This course learns about information and communication technology that can make daily work easier. Understanding device usage “Office Applications” software, Internet Technology, Use of software development of learning animation, development of technology and use of applications in education and being able to recognize internet-based business.

**FMA1.60.1301 General Biology 4 Credit Points**
This course discusses the knowledge of living things and scientific methods, cells as the basis of life, metabolism, structure and organization of plant and animal bodies, biodiversity, structure, functions and processes in human organ systems, ecology, genetics and evolution and biotechnology.

**FMA1.60.1303 General Physics 4 Credit Points**
This course discusses quantities and units, particle kinematics, particle dynamics, work and energy, linear momentum, angular momentum and rigid bodies, static fluids, dynamic fluids, concepts of temperature and heat, and the laws of thermodynamics.
**FMA1.60.1304 General Chemistry 4 Credit Points**

This course discusses Stoichiometry, Chemical Energetics, Atomic Structure, Periodic System of Elements, Chemical Bonds and Molecular Geometry, Forms of Matter and Chemical Equilibrium.

**FMA1.60.2101 Calculus 4 Credits**

This course discusses the real number system, equations and inequalities, absolute values and absolute inequalities, coordinate systems and simple graphs, functions, limits and continuity, derivatives, related rates, graphs, and integral applications in real problems.

**IPA1.61.1301 Education Statistics 2 Credits**

Basic notions in statistics, data presentation, center size and location size, symmetry and slope, deviation size, probability theory and probability distribution, sampling distribution, some tests include: normality test, homogeneity test of variance, regression linearity test and correlation. Non-Parametric Statistics include: sign test, test Wilkoxon, and test Liliefors

**IPA1.61.1401 Fundamentals of Environmental Science 2 Credits**


**IPA1.61.2301 Mechanics IPA 3 Credits**

Science Mechanics is an Expertise Course (MKBK). Mechanics course is a course that discusses the motion of an object and the effects of forces on the motion of the object. The discussion in this course is divided into two, namely classical mechanics and quantum mechanics. After attending this course, students are expected to be able to understand the concepts and principles of mechanics in general, so that they can analyze and solve problems from particle mechanics, to quantum mechanics.

**IPA1.61.2303 Fundamentals of Organic Chemistry 3 Credits**

Organic Chemistry basics course is one of the subjects in the field of expertise, with the aim that students can understand various organic phenomena and their existence in living things. This course is designed to provide an understanding of the meaning of carbon compounds, compound analysis and molecular formulas for the hybridization of sp3, sp2, and sp carbon atoms. Determine the forms of hybrid orbitals, the formation of covalent bonds, sigma bonds, and pi bonds, bond angles, introduction of organic compounds, saturated and unsaturated hydrocarbons, alkanes, cycloalkanes, alkenes, alkynes and aromatics, organic compounds with single functional groups (aliphatic and aromatic), hydroxy compounds, halides, carbonyls, carboxylic acids, and their derivatives, as well as practical work on certain topics.

**IPA1.61.2304 ICT for Science Learning 3 Credits**

The ICT course for science learning is one of the subjects in the field of expertise that aims to provide understanding and skills in utilizing technology and information in the implementation of science learning in schools. This course is designed to provide understanding and soft skills about technology and information that can be applied in the implementation of science learning in schools.

**IPA1.61.2305 Diversity of Living Things 3 Credits**

This course explains the concept of species, and their relation to the diversity of living things, the purpose and benefits of biological diversity in ecological, social, and economic terms. Explain the taxonomic principles (determination, classification, and nomenclature) of living things in the kingdom monera, protists, fungi, plants and animals. Explain the approach to preserving the diversity of living things that are in accordance with human needs in ecological, social, and economic contexts. Describe the facts and causes of the decline in the level of diversity of living things and propose prevention plans in Sumatra and Indonesia.

**IPA1.61.3301 Thermal Physics 3 Credits**

Thermal Physics is an Expertise Course (MKBK). Thermal physics course is a subject that discusses thermal energy, its properties, applications and advantages in everyday life. After carrying out this lecture, students are expected to be able to understand the concepts and principles of thermal energy in general, so that they can analyze thermal energy problems, both problems in the form of questions, practicums and problems that occur in everyday life.
IPA1.61.3401 Introduction to Ecology 3 Credits
This course will discuss the basic concepts and principles of ecology, ecosystems, energy in ecosystems, biogeochemical cycles, limiting factors in the environment, population dynamics, interactions between species, succession, tropical ecology, and environmental ethics and apply the knowledge possessed in activities in the surrounding environment/community.

IPA1.61.3302 Fundamentals of Inorganic Chemistry 3 Credits
The basics of Inorganic Chemistry course is one of the subjects in the field of expertise, with the aim that students can understand various things related to inorganic materials found in the surrounding environment and apply them in science learning at school. This course is designed to provide an understanding of chemical forces, basic principles of chemical reactions, bond energies, enthalpy and entropy, solubility of substances and the role of the medium in chemical reactions, acid base systems, water ion systems, solvent systems, proton acceptor donor systems, electron pair donor acceptor system, proton affinity, redox system, and electrochemistry which includes the relationship of redox reactions and acid-base reactions.

IPA1.61.3303 Earth Sciences and Astronomy 2 Credits
This course is a compulsory subject for the science education study program with a weight of 2 credits. As the name implies, the study material for this course focuses on two things, namely earth and space. When discussing the earth, students are expected to be able to understand the earth and its three layers, as well as the dynamic processes that take place in each layer. In addition, the study of the earth is also equipped with the topic of earth disasters, adaptation and mitigation. The study of astronomy begins with a discussion of the theory of the origin of the universe and the solar system, the solar system, and the characteristics of the sun, stars, and planet earth.

IPA1.61.3304 Laboratory Management Science 2 Credits
This course is a compulsory subject for all students majoring in Science Education with a weight of 3 credits. Through this course, students are expected to be able to recognize the laboratory as a whole, starting from the meaning, function, layout, organization and administration, as well as how best to store tools and materials in the laboratory. In addition, students are also expected to be able to understand the principles of safety and work safety in the laboratory which includes regulations in the laboratory.

IPA1.61.3305 Media and Science Learning Resources 2 Credits
This course discusses media or intermediaries for the science learning process which is enriched by the study of various teaching materials that can be used as provisions for prospective teachers. Students are expected to be able to master various uses of learning media effectively in applying them in the science learning process at school, especially at the junior high school level.

IPA1.61.3306 Study and Development of Science Education Curriculum 3 Credits
This course of study and development of the science curriculum is a compulsory subject to provide experience in the form of knowledge, attitudes, and skills to science education students in studying the science curriculum in junior high school. The focus of the study includes: (1) examining the professional competency standards of teachers as curriculum developers for the 2013 Curriculum; (2) examine the differences in the basic framework which includes: the nature, foundation, principles, and structure of the 2013 curriculum; (3) examine graduate competency standards, content standards, process standards, and assessment standards in the 2006 curriculum and 2013 curriculum according to the Ministry of Education and Culture policy; (4) examine the syllabus of the 2006 curriculum and the 2013 curriculum in the field of science; (5) designing learning plans that include: indicators, materials, learning strategies, assessments, and media and good learning resources referring to the 2013 curriculum, namely thematic-integrative.

IPA1.61.4301 Wave and Optics 3 Credits
Optical Waves is an Expertise Course (MKBK). Optical waves course is a course that discusses waves, their characteristics, properties and their application in everyday life. After carrying out this course, students are expected to be able to
understand the concepts and principles of waves and optics in general, so that they can analyze wave and optical problems, both problems in the form of questions, practicums and problems that occur in everyday life.

IPA1.61.4401 Anatomy and Physiology of Living Things 3 Credit Points
Anatomy and Physiology of Living Things is a course that discusses the structure of cells, tissues and organs, basic concepts of physiology, growth and development, metabolism, locomotion systems, respiratory systems, circulatory systems, digestive systems, excretory systems, coordination systems, reproductive systems. , studying the diseases of living things.

IPA1.61.4302 Integrated Science Class VII 3 Credits
The Integrated Science Class VII course is one of the subject areas of expertise that aims to discuss the concept of integrated science learning material for class VII in junior high schools. This course is designed in addition to providing an understanding of concepts related to science learning for class VII in junior high school, it also discusses learning approaches, common misconceptions and assessments, media that can be used in learning. The study concepts discussed are science concepts for class VII that have been determined by the government in the curriculum 2013.

IPA1.61.4303 Science Learning Strategy and Design 3 Credits
This course includes material on identifying student characteristics and learning science for junior high school, analyzing curriculum, formulating learning objectives, analyzing learning materials, determining and designing learning experiences that are in accordance with the characteristics of the material and learning objectives, determining approaches and methods according to the characteristics of the material and learning objectives.

IPA1.61.4304 Fundamentals of Analytical Chemistry 3 Credits
This course is a basic and mandatory course. After attending this course, students are expected to be able to explain the basics of chemical analysis methods, especially conventional ones. This course discusses the scope and classification of analytical chemistry, stages of analytical work, statistical applications in data processing, qualitative analysis of inorganic substances, gas analysis, water-free titration. Implementation of lectures using a concept approach in the form of lectures, questions and answers and exercises and is equipped with LCD

IPA1.61.5301 Electricitymagnetism 3 Credits
Magnetism is an Expertise Course (MKBK). Electricity-magnetism course is a course that discusses electrostatics and magnetostatics and their application in everyday life. After carrying out this lecture, students are expected to be able to understand the concepts and principles of magnetic electricity in general, so that they can analyze magnetic electricity problems, both problems in the form of questions, practicals and problems that occur in everyday life.

IPA1.61.5302 Fundamentals of Microbiology 3 credits
This course discusses the grouping of microorganisms based on morphological characteristics, chemical and molecular coloring, the role of microorganisms in nature, reproduction, growth and metabolism of microorganisms, summarizes the latest research in the field of microbiology through journal reviews and discussions

IPA1.61.5401 Ethnoscience and Local Wisdom 3 Credits
This Ethnoscience and Local Wisdom course is a course that discusses the principles and concepts of basic science and environmental technology based on Minangkabau local wisdom and designs and uses applied science concepts related to Minangkabau local wisdom in an integrated way in science learning. Develop an ethnoscience-based learning model that develops views on the social environment, culture and religious attitudes.

IPA1.61.5503 Integrated science class VIII 3 credits
The Integrated Science Class VIII course is one of the courses in the field of expertise that aims to discuss the concept of integrated science learning material for class VIII in junior high schools. This course is designed in addition to providing an understanding of concepts related to science learning for class VIII in junior high school, it also discusses learning approaches, common misconceptions and assessments that can be used in learning. The study concepts discussed are science concepts for class VIII that have been set by the government in the 2013 curriculum
IPA1.61.5304 Evaluation of Science Learning Process and Outcomes 3 Credits
This course provides a basic understanding of educational evaluation which includes mastering the objectives and functions of assessment, the role of evaluation in PBM; evaluation procedures and forms; assessed ability; planning, preparation, analysis of test subjects, validity and reliability of tests/tests (concepts and process skills) processing of assessment results; performance assessment, including portfolio, practicum assessment; and class-based assessment.

IPA1.61.6301 Modern Physics 3 Credits
Modern physics is a subject in the field of expertise (MKBK). Modern physics courses provide an explanation from the 19th century on a phenomenon, where the phenomenon can only be explained by modern devices. Modern physics generally assumes that a consistent explanation of these observations would incorporate elements of quantum mechanics and relativity. After carrying out this lecture, students are expected to be able to understand the concepts and principles of modern physics in general, so that they can analyze modern physics problems, both problems in the form of questions, practicums and problems that occur in everyday life.

IPA1.61.6302 Fundamentals of Biochemistry 3 Credits
The basics of biochemistry course is one of the subjects in the field of expertise, with the aim that students can understand various things related to chemistry in the life sciences. This course discusses the basic principles of biochemistry, cell structure and function, water, amino acids, proteins, enzymes, carbohydrates, nucleic acids, lipids, vitamins, minerals, hormones, antibodies, antibiotics, and membrane transport.

IPA1.61.6303 Integrated Science Class IX 3 Credits
This course discusses the material of the human reproductive system, the reproductive system of plants and animals; population development and environmental impacts; atoms, ions, and molecules; static electricity, electric circuits and sources of electrical energy, magnetism and electromagnetic induction, human heredity; environmentally friendly technology production, biotechnology and food production, soil and life

IPA1.61.6304 Microteaching 3 Credits
This course aims to train students to analyze the latest curriculum according to the curriculum used by the government. This course requires students to be able to analyze the curriculum so that they are able to make lesson plans, syllabus and learning scenarios to prepare students to be skilled in teaching. This course aims to prepare students to carry out professional training programs, especially in analyzing junior high school science subject matter, estimating the level of depth and breadth of teaching materials, making teaching preparation programs and lesson plans, as well as practicing them, choosing and using appropriate approaches, methods, and media to teach the material. certain.

IPA1.61.6305 Research Methodology for Science Learning 3 Credits
This course discusses research methods, research problems and variables, how to obtain information for research purposes, types of research in the field of research, sampling techniques, instrumentation, research design, data collection and analysis, writing proposals or research plans.

IPA1.61.6306 Biotechnology 3 Credits
This course is an applicative-theoretical interdisciplinary. After taking this course, students are expected to understand that biotechnology is developed on the basis of the application of biological processes that are packaged in a certain technology to meet the needs of human life. In addition, students are also expected to have insight into the ethics of Biotechnology that can be used as a basis for building independent attitudes in responding to policy issues and the implementation of biotechnology in human life. This course examines and discusses biological concepts that underlie the development and application of biotechnology in various aspects of human life. The study begins with the understanding and basic principles of Biotechnology, the biological concepts that underlie the development of Biotechnology, followed by a discussion on the application of biotechnology in the food/beverage and drug/pharmaceutical industries, medicine, agriculture, forestry, environment and energy resources. As a provision for attitude development, this course also examines and discusses issues related to the ethics of implementing Biotechnology. Learning is presented mostly through contextual teaching and learning by revealing facts (biotechnology products or processes) found in everyday life, including through lectures, questions and answers, assignments and group discussions. This course also examines and discusses issues related to the ethics of implementing Biotechnology. Learning is presented mostly through contextual teaching and learning by revealing facts (biotechnology products or processes) found in everyday life, including through lectures, questions and answers, assignments and group discussions. This course also examines and discusses issues related to the ethics of implementing Biotechnology. Learning is presented mostly through contextual teaching and learning by revealing facts (biotechnology products or processes) found in everyday life, including through lectures, questions and answers, assignments and group discussions.

IPA1.61.7301 English for Science 2 Credits
This course is a compulsory subject for the science education study program which is intended so that students are able to use knowledge about science education...
basic tenses and English material that has been obtained previously in the activity scientific reading, speaking, and writing. Through this course, students are expected to be able to master the four basic tenses (simple present, past tense, present perfect, and present continuous) when used in academic writing, then students are also expected to be able to master the form of passive sentences, use of gerunds and to-infinitives, adjectives clause, noun clause and its application in scientific reading, speaking, and writing.

**IPA2.61.8401 Thesis 6 Credits**
Submission of research proposal outlines to the head of study programs, acceptance of research proposal outlines, determination of supervisors 1 and 2, research proposal writing, research proposal seminars, research proposal refinement, research implementation in schools, research report preparation, thesis examination, research report improvement, and article writing for e-journal

**IPA2.61.3401 Conservation of Natural Resources 2 Credits**
This course is an elective course, after taking this course students are expected to master the basic concepts of conservation and natural resources. Further studies cover the conservation of biology and biodiversity, various types of energy conservation, supporting factors for energy conservation, energy conservation related to sustainable development and the role of culture in the conservation of natural resources in Indonesia.

**IPA2.61.3301 Capita Selecta IPA 2 Credits**
This course is an elective course, after attending this course students are expected to be able to respond wisely to issues that are developing at this time according to their scientific field.

**IPA2.61.4301 Matter and Energy 2 Credits**
This course is one of the elective courses of the study program with a weight of 2 credits. This course is also a deepening of what students have learned in General Chemistry courses. Through this course, students are expected to be able to further understand the concepts of Matter and Energy, ranging from the notion of matter and its various forms, classification of matter, atoms and molecules, subatomic particles, the arrangement of atoms in matter, the concept of energy and its changes, the law of conservation of energy, to various form of energy use in human life.

**IPA2.61.5301 Technology Physics 2 Credits**
Technology is an Expertise Course (MKBK) which is an elective course. After carrying out this lecture, students are expected to be able to understand the concepts and principles of physics so that they can apply them in facilitating work and daily activities in the form of technology. Both technology across the physical sciences, as well as technology that only uses one concept of physics. Neither complex technology, nor simple technology.

**IPA2.61.5302 Applied Chemistry 2 Credits**
The Science Applied Chemistry course is one of the subjects in the field of expertise (optional) which aims to provide an understanding of the manufacture of chemical products that are commonly found in everyday life. Students are expected to be able to apply knowledge of science, especially chemistry, in the manufacture of materials for daily needs.

**IPA2.61.6301 Redox and Electrochemistry 2 Credit Points**
Materials and Energy, This course is an elective course with a weight of 2 credits that students can take as a deepening of this material that has been discussed in General Chemistry lectures. Through this course, students are expected to be able to simplify redox reactions using various methods that have been known so far; understand the standard Reduction Potential and its use in calculations; understand the workings of the Voltaic Cell and its components; understand the thermodynamics of redox reactions; understand the effect of concentration on standard reduction potential; able to understand the intent and perform calculations with the Nernst equation; know the types of batteries and understand how they work; understand the physical and chemical changes that occur in the corrosion process; understand the process of electrolysis and recognize the components of an electrolytic cell.

**IPA2.61.6302 Foodstuff Chemistry 2 Credits**
The Food Chemistry Science course is one of the subjects in the field of expertise (optional) which aims to provide an understanding of the processing of foodstuffs that are commonly found in everyday life and viewed from the point of view of the study of chemistry. Students are expected to be able to apply science knowledge, especially chemistry in manufacturing, as well as control the quality of food ingredients in daily life.
IPA2.61.6303 Applied Biology 2 Credits
The course content includes: biogas production, hydroponics and plant propagation, tape yeast making, tempeh yeast making, nata de coco making, coconut fermentation by fermentation, yogurt making, white bread making.

IPA2.61.7301 Applied Physics 2 Credits
Applied Physics is an Expertise Course (MKBK) which is an elective course. After carrying out this course, students are expected to be able to understand the concepts and principles of physics so that they can apply them in facilitating work and daily activities.

IPA2.61.7401 Science Entrepreneur 2 Credits
This course is an elective course. After attending this course, students are expected to master the principles of entrepreneurship which include the scope, nature, values and characteristics as well as the nature and spirit of entrepreneurship. Able to conduct business analysis, develop business plans, practice entrepreneurial methods. Entrepreneurship is related to creative and innovative abilities to seek science-based business opportunities.

E. ORGANIZATION AND PERSONNEL

Faculty Leaders
1. Dean and Deputy Dean
   Dean: Prof. Dr. H. Lufri, M.S
   Deputy Dean I: Dr. Yulkifli, S.Pd, M.Si
   Deputy Dean II: Drs. Hendra Syarifuddin, M.Si, Ph.D
   Deputy Dean III: Dr. Hardeli, M. Si

2. Faculty Senate
   Chairman: Prof. Dr. Lufri, M.S
   Members:
   - Dr. Yulkifli, S.Pd, M.Si
   - Drs. Hendra Syarifuddin, M.Si, Ph.D
   - Dr. Hardeli, M.Si
   - Muhammad Subhan, S.Si., M.Si
   - Dr. Azwir Anhar, M.Si
   - Dr. H. Mawardi, M.Si
   - Dr. Ratnawulan, M.Si
   - Prof. Dr. H. Ahmad Fauzan, M.Pd.,M.Sc
   - Dr. Edwin Musdi, M.Pd
   - Drs. Syafriandi, M.Si
   - Drs. H. Yarman, M.Pd
   - Dra. Moralita Chatri, M.P
   - Dra. Mades Fifendy, M.Biomed
   - Dr. Hj. Zailyusri, MP
   - Dra. Helendra, M.S
   - Prof. Drs. Ali Amran, M.Pd., MA., Ph.D
   - Dra. Andromeda, M.Si
   - Dr. Indang Dewata, M.Si
   - Budhi Oktavia, S.Si., M.Si., Ph.D
   - Prof. Dr. Festiyed, M.S
   - Drs. Amali Putra, M.Pd
   - Dr. H. Ahmad Fauzi, M.Si
   - Syafriani, M.Si., Ph.D

3. Administration
   Kabag Tata Usaha: Erizon, S.Pd
   Kasubag Umum dan BMN: Usman, S.Pd
   Kasubag Akademik dan Kemahasiswaan: Dra. Fitrini
   Kasubag Perenc. Keuangan & Kepegawaian: Ernawati, S.Pd
4. Department Leader
   a. Mathematics
      Chairman: Muhammad Subhan, S.Si, M.Si
      Secretary: Dra. Dewi Murni, M.Si
   b. Biology
      Chairman: Dr. H. Azwir Anhar, M.Si
      Secretary: Dr. H. Syamsurizal, M. Biomed
   c. Physics
      Chairman: Dr. Ratnaawulan, M.Si
      Secretary: Yohandri, S.Si, M.Si, Ph.D
   d. Chemistry
      Chairman: Dr. Mawardi, M.Si
      Secretary: Edi Nasri, S.Si, M.Si
   e. Science Education
      Chairman: Dra. Yurnetti, M.Pd
      Secretary: Tuti Lestari, S.Si, M.Si
   f. Coordinator of TPB Courses
      Chairman: Dra. Hidayati, M.Si

5. Study Program Leader
   a. Biology Program Chairman (S1)
      : Dr. Ramadhan Sumarmin, S.Si, M.Si
   b. Physics Program Chairman (S1)
      : Syafriani, S.Si, M.Si, Ph.D
   c. Chemistry Program Chairman (S1)
      : Hary Sanjaya, M.Si
   d. Environmental Science Program Chairman (S2)
      : Dr. Indang Dewata, M.Si
   e. Mathematics Program Chairman (S1)
      : Dra. Media Rosha, M.Si
   f. Biology Education Program Chairman (S1)
      : Drs. Ardi, M.Si
   g. Biology Education Program Chairman (S2)
      : Dr. Yuni Ahda, S.Si, M.Si
   h. Physics Education Program Chairman (S1)
      : Dra. Yenni Darvina, M.Si
   i. Physics Education Program Chairman (S2)
      : Dr. Ahmad Fauzi, M.Si
   j. Chemistry Education Program Chairman (S1)
      : Dr. Fajriah Azra, S.Pd, M.Si
   k. Chemistry Education Program Chairman (S2)
      : Budhi Oktavia, S.Si, M.Si, Ph.D
   l. Mathematics Education Program Chairman (S1)
      : Dr. Irwan, M.Si
   m. Statistics Program Chairman (S1)
      : Dr. Doni Permana, M.Si
   o. Educational Science Program Coordinator (S3)
      : Prof. Dr. Ahmad Fauzan, M.Pd, M.Sc
   p. Mathematics Education Program Coordinator (S2)
      : Dr. Yerizon, M.Si
   q. Statistics Program Coordinator (D3)
      : Dra. Nonong Amalita, M.Si

6. Laboratory Management
   a. Mathematics
      Laboratory Chairman: Suherman, S.Pd, M.Si
      Laboratory Secretary: Meira Parma Dewi, S.Si, M.Kom
   b. Biology
      Laboratory Chairman: Drs. Mades Fifendi, M.Biomed
      Laboratory Secretary: Dr. Dwi Hilda, M.Si
      Sub Laboratory Coordinator
      - Developmental Structure / Animal Systematics
        : Dra. Helendra, M.S
      - Microbiology
        : Irdawati, M.Si
      - Function Biology
        : Dr. Linda Advinda, M.Kes
      - Genetics & Biotechnology
        : Dr. Yuni Ahda, M.Si
      - Environmental Biology
        : Dra. Vauzia, M.Si
      - Fundamental Biology
        : Dr. Moralita Chatri, M.P
      - Learning
        : Dra. Heffi Alberida, M.Si
      - Research
        : Dr. Violita, M.Si
   c. Physics
      Laboratory Chairman: Drs. Akmam, M.Si
      Laboratory Secretary: Zulhendri Kamus, S.Pd, M.Si
      Sub Laboratory Coordinator
      - Fundamental Physics
        : Dra. Hidayati, M.Si
      - Advanced Physics
        : Drs. Hufri, M.Si
      - Electrons & Instrumentation
        : Drs. H. Asrizal, M.Si
      - Material Physics & Biophysics
        : Dr. Ramli, M.Si
      - Physics Learning
        : Dra. Murtiani, M.Pd
      - Workshop & Photography
        : Dra. Yurnetti, M.Pd
      - Computational Physics
        : Drs. H. Masril, M.Si
      - Geophysics
        : Harman Amir, S.Si, M.Si
   d. Chemistry
      Laboratory Chairman: Dr. rer. nat, Jon Efendi, M.Si
      Laboratory Secretary: Dr. Rahadian, Z, S.Pd, M.Si
      Study Field Coordinator
      - General Chemistry
        : Dra. Iryani, M.Si
      - Organic Chemistry
        : Dra. Sri Beni Etika, M.Si
      - Physics Chemistry
        : Dr. Hardeli, M.Si
      - Analytical Chemistry
        : Alizar, S.Pd, M.Si, Ph.D
      - Biochemistry
        : Drs. Iswendi, M.S
      - Inorganic Chemistry
        : Dra. Hj. Bayharti, M.Sc
      - Chemistry Learning
        : Prof. Dr. Hj. Elizar, M.Pd
      - Chemistry Research
        : Drs. Iswendi, M.S
7. Supporting Facilities

a. Mathematics Laboratory
The Department of Mathematics has a laboratory that can be used for student practicum, which consists of a mathematics learning laboratory and a computational and statistical laboratory.

b. Biology Laboratory
The Department of Biology has 8 laboratories, namely basic biology laboratories, botany, zoology, plant physiology, ecology, biotechnology, genetics, animal physiology, microbiology, biology learning and computer labor, all of which are equipped with equipment according to the needs of student practicum and research.

c. Physics Laboratory
The Department of Physics has 8 laboratories, namely 1) basic physics, 2) physics learning, 3) materials and biophysics, 4) workshops & photography, 5) computing, 6) Geophysics, 7) electronics & instrumentation, 8) advanced physics.

d. Chemistry Laboratory
The Chemistry Department has 8 laboratories, namely basic chemistry laboratories, organic chemistry, physical chemistry, analytical chemistry, biochemistry, inorganic chemistry, instruments, chemistry learning, and chemical research laboratories, all of which are equipped with various practical equipment and are used for student practicum and research.

e. Faculty and Department Reading Room
Faculties and each department have 1 reading room, which has a variety of textbooks and references for research.

8. Teaching Staff of the Faculty of Mathematics and Natural Sciences

<table>
<thead>
<tr>
<th>No.</th>
<th>Code</th>
<th>Name</th>
<th>Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3227</td>
<td>Drs. Armen, S.U</td>
<td>S2</td>
</tr>
<tr>
<td>2</td>
<td>3228</td>
<td>Drs. Ristiono, M.Pd</td>
<td>S2</td>
</tr>
<tr>
<td>3</td>
<td>3229</td>
<td>Prof. Dr. Lufri, M.S</td>
<td>S3</td>
</tr>
<tr>
<td>4</td>
<td>3230</td>
<td>Drs. Mades Fifendy, M.Biomed</td>
<td>S2</td>
</tr>
<tr>
<td>No.</td>
<td>Code</td>
<td>Name</td>
<td>Education</td>
</tr>
<tr>
<td>-----</td>
<td>--------</td>
<td>--------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>1</td>
<td>3320</td>
<td>Dra. Murtiani, M.Pd</td>
<td>S2</td>
</tr>
<tr>
<td>2</td>
<td>3323</td>
<td>Drs. Amali Putra, M.Pd</td>
<td>S2</td>
</tr>
<tr>
<td>3</td>
<td>3327</td>
<td>Drs. Akmam, M. Si</td>
<td>S2</td>
</tr>
<tr>
<td>4</td>
<td>3328</td>
<td>Drs. Gusnardi, M. Si</td>
<td>S2</td>
</tr>
<tr>
<td>5</td>
<td>3329</td>
<td>Drs. Mawduri, M. Si</td>
<td>S3</td>
</tr>
<tr>
<td>6</td>
<td>3331</td>
<td>Dr. Yenni Darvina, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>7</td>
<td>3332</td>
<td>Drs. Masril, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>8</td>
<td>3333</td>
<td>Dr. Handi, M. Si</td>
<td>S3</td>
</tr>
<tr>
<td>9</td>
<td>3334</td>
<td>Drs. Arzal, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>10</td>
<td>3335</td>
<td>Drs. Hufri, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>11</td>
<td>3336</td>
<td>Dr. Ahmad Fauzi, M.Si</td>
<td>S3</td>
</tr>
<tr>
<td>12</td>
<td>3337</td>
<td>Dr. Ratna, M.Si</td>
<td>S3</td>
</tr>
<tr>
<td>13</td>
<td>3338</td>
<td>Dr. Letmi Dwiridal, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>14</td>
<td>3339</td>
<td>Sayyidani, S. Si, M.Si, Ph.D</td>
<td>S3</td>
</tr>
<tr>
<td>15</td>
<td>3340</td>
<td>Harman Amir, S. Si, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>16</td>
<td>3341</td>
<td>Dr. Fatni Mufit, P.D, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>17</td>
<td>3342</td>
<td>Zulhendri, S.Pd, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>18</td>
<td>3343</td>
<td>Dr. Ramli, S.Pd, M.Si</td>
<td>S3</td>
</tr>
<tr>
<td>19</td>
<td>3344</td>
<td>Dr. Yulki, S.Pd, M.Si</td>
<td>S3</td>
</tr>
<tr>
<td>20</td>
<td>3345</td>
<td>Pakhir Razi, S.Pd, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>21</td>
<td>3346</td>
<td>Nofi Yendri Sudiar, S.Si</td>
<td>S3</td>
</tr>
<tr>
<td>22</td>
<td>3347</td>
<td>Yohandri, M.Si, Ph.D</td>
<td>S3</td>
</tr>
<tr>
<td>23</td>
<td>3348</td>
<td>Dra. Hidayati, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>24</td>
<td>3350</td>
<td>Riri Junaarti, S.Pd, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>25</td>
<td>3351</td>
<td>Silvi Yulia Sari, M.Pd</td>
<td>S2</td>
</tr>
<tr>
<td>26</td>
<td>3352</td>
<td>Renol Afrizon, M.Pd</td>
<td>S2</td>
</tr>
<tr>
<td>27</td>
<td>3353</td>
<td>Ria Amshari, S.Pd, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>28</td>
<td>3354</td>
<td>Wahyuni Satira Dewi, S.Pd, M.Pd</td>
<td>S2</td>
</tr>
<tr>
<td>29</td>
<td>3352</td>
<td>Dr. Desinta, M.Si</td>
<td>S3</td>
</tr>
<tr>
<td>30</td>
<td>171027</td>
<td>Fandi Oktasendra, M. Sc</td>
<td>S2</td>
</tr>
<tr>
<td>31</td>
<td>172026</td>
<td>Fanny Rahmatina Rahim, M.Pd</td>
<td>S2</td>
</tr>
</tbody>
</table>

**Chemistry Department**

<table>
<thead>
<tr>
<th>No.</th>
<th>Code</th>
<th>Name</th>
<th>Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>172061</td>
<td>Rahmah Evita Putri, M.Pd</td>
<td>S2</td>
</tr>
<tr>
<td>33</td>
<td>181032</td>
<td>Rahmat Hidayat, S.Pd, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>34</td>
<td>171074</td>
<td>Mairizwan, S.Pd, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>35</td>
<td>172062</td>
<td>Dra. Bayharti, M.Sc</td>
<td>S2</td>
</tr>
<tr>
<td>36</td>
<td>172063</td>
<td>Prof. Dr. Elizar, M. Pd</td>
<td>S3</td>
</tr>
<tr>
<td>37</td>
<td>172064</td>
<td>Dr. Andromeda, M.Si</td>
<td>S3</td>
</tr>
<tr>
<td>38</td>
<td>172065</td>
<td>Dr. Sari Benti Etika, M. Si</td>
<td>S2</td>
</tr>
<tr>
<td>39</td>
<td>172066</td>
<td>Dr. Hardeli, M. Si</td>
<td>S3</td>
</tr>
<tr>
<td>40</td>
<td>172067</td>
<td>Prof. Dr. Mindi Azhar, M.Si</td>
<td>S3</td>
</tr>
<tr>
<td>41</td>
<td>172068</td>
<td>Dra. Suryelita, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>42</td>
<td>172069</td>
<td>Ananda Putra, S.Si, M.Si, Ph.D</td>
<td>S3</td>
</tr>
<tr>
<td>43</td>
<td>172070</td>
<td>Budhi Oktavia, S.Si, M.Si, Ph.D</td>
<td>S3</td>
</tr>
<tr>
<td>44</td>
<td>172071</td>
<td>Dr. Indang Dewata, M. Si</td>
<td>S3</td>
</tr>
<tr>
<td>45</td>
<td>172072</td>
<td>Dr. Rahadian, Z.S.Pd, M.Si</td>
<td>S3</td>
</tr>
<tr>
<td>46</td>
<td>172073</td>
<td>Dr. Fajriah, S.Pd, M.Si</td>
<td>S3</td>
</tr>
<tr>
<td>47</td>
<td>172074</td>
<td>Miftahul, Khair, S.Si, M.Sc, Ph.D</td>
<td>S3</td>
</tr>
<tr>
<td>48</td>
<td>172075</td>
<td>Edi Nasra, S.Si, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>49</td>
<td>172076</td>
<td>Umar Kalmar, S.Si, M.Si, Ph.D</td>
<td>S3</td>
</tr>
<tr>
<td>50</td>
<td>172077</td>
<td>Dr. Yerimadesi, S.Pd, M.Si</td>
<td>S3</td>
</tr>
<tr>
<td>51</td>
<td>172078</td>
<td>Dr. Desy Kurniawati, S.Pd, M.Si</td>
<td>S3</td>
</tr>
<tr>
<td>52</td>
<td>172079</td>
<td>Deski Beri, S.Si, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>53</td>
<td>172080</td>
<td>Effendi, S.Pd, M.Sc</td>
<td>S2</td>
</tr>
<tr>
<td>54</td>
<td>172081</td>
<td>Sherly Kasuma, S.Si, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>55</td>
<td>172082</td>
<td>Guspaki, S.Pd, M.A</td>
<td>S2</td>
</tr>
<tr>
<td>56</td>
<td>172083</td>
<td>Hary Sanjaya, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>No.</td>
<td>Code</td>
<td>Name</td>
<td>Education</td>
</tr>
<tr>
<td>-----</td>
<td>-------</td>
<td>-------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>29</td>
<td>3453</td>
<td>Fitri Amelia, S.Si, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>30</td>
<td>3454</td>
<td>Zonalia Fitriza, M.Pd</td>
<td>S2</td>
</tr>
<tr>
<td>31</td>
<td>3455</td>
<td>Fauzana Gazali, M.Pd</td>
<td>S2</td>
</tr>
<tr>
<td>32</td>
<td>3456</td>
<td>Alizar, S.Pd, M.Sc, Ph.D</td>
<td>S2</td>
</tr>
<tr>
<td>33</td>
<td>3457</td>
<td>Eka Yusmaia, S.pd, M.Pd</td>
<td>S2</td>
</tr>
<tr>
<td>34</td>
<td>0213</td>
<td>Melinda Mulia, S.Si, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>35</td>
<td>172025</td>
<td>Faizah Qurata Aini, S.Pd, M.Pd</td>
<td>S2</td>
</tr>
<tr>
<td>36</td>
<td>172038</td>
<td>Hesty Purbuntari, S.Pd, M.Sc</td>
<td>S2</td>
</tr>
<tr>
<td>37</td>
<td>182007</td>
<td>Annisa Dewi Pangestuti, S.Si, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Physics Department</strong></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>3153</td>
<td>Muhammad Subhan, S. S., M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>24</td>
<td>3154</td>
<td>Dodi Vionanda, S.Si, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>25</td>
<td>3155</td>
<td>Dr. Dony Permata, M.Si</td>
<td>S3</td>
</tr>
<tr>
<td>26</td>
<td>3156</td>
<td>Meira Parma Dewi, S.Si, M.Kom</td>
<td>S2</td>
</tr>
<tr>
<td>27</td>
<td>3157</td>
<td>Riry Sriningsih, S.Si, M.Sc</td>
<td>S2</td>
</tr>
<tr>
<td>28</td>
<td>3158</td>
<td>Mima, S.Pd, M.Pd</td>
<td>S2</td>
</tr>
<tr>
<td>29</td>
<td>3159</td>
<td>Devni Prima Sari, S.Si, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>30</td>
<td>3160</td>
<td>Yenni Kurniawati, S.Si, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>31</td>
<td>3161</td>
<td>Defri Ahmad, S.Pd, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>32</td>
<td>3162</td>
<td>Dr. Ali Asma, M.Pd</td>
<td>S3</td>
</tr>
<tr>
<td>33</td>
<td>3163</td>
<td>Fridgo Tasman, S.Pd, M.Sc</td>
<td>S2</td>
</tr>
<tr>
<td>34</td>
<td>3164</td>
<td>Fitri Mudia Sari, S.Si, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>35</td>
<td>0246</td>
<td>Heru Maulana, S.Pd, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>36</td>
<td>172007</td>
<td>Anggit Reviana Dewi Agustany, S.Pd, M.Pd</td>
<td>S2</td>
</tr>
<tr>
<td>37</td>
<td>172019</td>
<td>Dina Fitrina, S.Pd, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>38</td>
<td>172041</td>
<td>Khairani, S.Pd, M.Pd</td>
<td>S2</td>
</tr>
<tr>
<td>39</td>
<td>182005</td>
<td>Adni Salma, S.Pd., M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>40</td>
<td>182016</td>
<td>Fadhilah Fitri, S.Si., M.Stat</td>
<td>S2</td>
</tr>
<tr>
<td>41</td>
<td>182032</td>
<td>Nural Afifah Rasyda, S.Pd., M.Pd</td>
<td>S2</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Mathematics Department</strong></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>3125</td>
<td>Dr. Edwin Musdi, M.Pd</td>
<td>S3</td>
</tr>
<tr>
<td>2</td>
<td>3126</td>
<td>Dra. Elita Zusti Jamaan, MA</td>
<td>S2</td>
</tr>
<tr>
<td>3</td>
<td>3127</td>
<td>Dra. Sri Elniati, MA</td>
<td>S2</td>
</tr>
<tr>
<td>4</td>
<td>3128</td>
<td>Drs. Mukhi, M.Pd</td>
<td>S2</td>
</tr>
<tr>
<td>5</td>
<td>3129</td>
<td>Drs. H. Yarman, M. Pd</td>
<td>S2</td>
</tr>
<tr>
<td>6</td>
<td>3131</td>
<td>Dra. Media Rosha, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>7</td>
<td>3132</td>
<td>Dra. Arnellis, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>8</td>
<td>3134</td>
<td>Dr. Armiati, M.Pd</td>
<td>S3</td>
</tr>
<tr>
<td>9</td>
<td>3136</td>
<td>Dra. Jazwinanti, M.Pd</td>
<td>S2</td>
</tr>
<tr>
<td>10</td>
<td>3137</td>
<td>Dra. Fitriani Dwina, M.Ed</td>
<td>S2</td>
</tr>
<tr>
<td>11</td>
<td>3138</td>
<td>Dra. Minora Longgrom Nasution, M.Pd</td>
<td>S2</td>
</tr>
<tr>
<td>12</td>
<td>3140</td>
<td>Prof. Dr. Ahmad Fauzan, M.Pd</td>
<td>S3</td>
</tr>
<tr>
<td>13</td>
<td>3142</td>
<td>Drs. Syahrani, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>14</td>
<td>3143</td>
<td>Dr. Irwan, M.Si</td>
<td>S3</td>
</tr>
<tr>
<td>15</td>
<td>3144</td>
<td>Dra. Dewi Marmi, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>16</td>
<td>3146</td>
<td>Drs. Atus Amadi Putra, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>17</td>
<td>3147</td>
<td>Dra. Nonong Amalita, M. Si</td>
<td>S2</td>
</tr>
<tr>
<td>18</td>
<td>3148</td>
<td>Drs. Hendra Syarifuddin, M.Si, Ph.D</td>
<td>S3</td>
</tr>
<tr>
<td>19</td>
<td>3149</td>
<td>Drs. Yusmet Rizal, M, S</td>
<td>S2</td>
</tr>
<tr>
<td>20</td>
<td>3150</td>
<td>Dr. Yerizon, M.Si</td>
<td>S3</td>
</tr>
<tr>
<td>21</td>
<td>3151</td>
<td>Dra. Helma, M. S,</td>
<td>S2</td>
</tr>
<tr>
<td>22</td>
<td>3152</td>
<td>Suherman, S.Pd, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Science Education Department</strong></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>3325</td>
<td>Dra. Yurnetti, M. Pd</td>
<td>S2</td>
</tr>
<tr>
<td>2</td>
<td>3423</td>
<td>Dr. Latisma Dj, M.Si</td>
<td>S3</td>
</tr>
<tr>
<td>3</td>
<td>172119</td>
<td>Dr. Skunda Dilarosta, M.Pd</td>
<td>S3</td>
</tr>
<tr>
<td>4</td>
<td>172001</td>
<td>Tuti Lestari, S.Si, M.Si</td>
<td>S2</td>
</tr>
<tr>
<td>5</td>
<td>171006</td>
<td>Arief Muttaqin, S.Pd, M.Pd</td>
<td>S2</td>
</tr>
<tr>
<td>6</td>
<td>171008</td>
<td>Aristo Hardnata, S.Pd, M.Pd</td>
<td>S2</td>
</tr>
<tr>
<td>7</td>
<td>172061</td>
<td>Rahmah Evita Putri, S.Pd, M.Pd</td>
<td>S2</td>
</tr>
<tr>
<td>8</td>
<td>182034</td>
<td>Kani Oktavia, S.Pd., M.Pd</td>
<td>S2</td>
</tr>
<tr>
<td>9</td>
<td>172047</td>
<td>Monica Prima sari, M.Pd</td>
<td>S2</td>
</tr>
</tbody>
</table>