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TOTAL credits semester 146 Credits
TOTAL Course 49
DESCRIPTION OF THE COURSES

1. BASIC NATURE SCIENCE

Learning Out Comes: LO 2 (S), LO 5 (M), LO 6 (S), LO 9 (S)

Description:

- In order for students to understand the basic chemical concepts needed to understand the related concepts of biological sciences, and are expected to have knowledge of the basics of chemistry, as a basis for further understanding of chemistry and chemical processes occurring in the environment as well as in the laboratory.
- Students understand the physical phenomena and their relationship to Biology.

Material:

- Fundamentals of chemistry Atomic and periodic structures (emphasis on elements: C, Mg, K, N, P, S, Fe, Mn, Co, Cu, Zn, Mo, and Cl); The relationship between structure and properties; Chemical bonds: ions / electrovalents, covalent bonds, bhydrogen bonds, van Waals forces; Solution: gas solution, concentration, energitical aspect and chemical equilibrium, as well as material structure aspects.
- Magnitude and measurement, simple error theory, measurement of results, dimensional analysis; Kinematics and particle dynamics, Newton motion laws, linear motion, parabolic motion; Business and energy theory, impact, impulse and momentum, energy conservation law, frictional force; Kinematics and dynamics of rotation, law of conservation of angular momentum, moment of moment and moment of angle, equilibrium of strong body; Newton's law of gravity, oscillation, elasticity, statics and fluid dynamics; Physical properties of the medium (liquid conductivity, surface tension, fluid viscosity, gas kinetics theory, ideal gas properties, law of thermodynamics, air pressure, temperature and gas volume measurements Waves, superposition, peristaltic motion, interference, diffraction, and visibility, doplers, polarization, visible and non-visible rays, color spectrum, absorbance of light, optical physics Optical geometry Coulomb and Gauss Law, potential, capacitor, dielectric, direct current Lorentz force Biok-Savart, Law of Ampere, GGL induction, inductance, magnetism of materials, alternating current, physical properties of substrate (substrate electrical charge); Dualism of particles, atomic nuclei; Radioactivity.

Reference:

2. **INTRODUCTION TO EDUCATION**

**Learning Out Comes:** LO 2 (M), LO 4 (S), LO 5 (S), LO 7 (M), LO 9 (S)

**Description:**
Understand the basic theories of the science of education in the context of today's MIPA-education

**Material:**

**Reference:**
6. ------, 2001, *Filsafat Ilmu Pendidikan; Suatu pengantar*, Bandung: PT. Remaja Rosdakarya,

3. **TEACHER’S PROFESSION**

**Learning Out Comes:** LO 2 (S), LO 3 (M), LO 5 (S), LO 9 (S)

**Description:**
Students understand a set of materials on teacher duties, roles, and competencies.

**Material:**
The subjects include: effective learning conditions; classification and purpose of process assessment; preparation of learning programs; assessment of teaching ability; the role of teachers in the administration of education in schools, the attitudes of duties and professional reflection, the basic
concepts of guidance and counseling; the basics of educational leadership, super vision of education in school.

Reference:

4. PANCASILA (Five Fundamental Principles of Indonesia)

Learning Out Comes: LO 1 (S), LO 4 (M), LO 5 (S), LO 9 (L), LO 10 (S)

Description:
After taking the course of Civic Education, students can appreciate and apply the insights of the nation, national resilience, national policies and strategies, especially in the field of national defense and security and the defense system of the security of the people to strengthen the spirit in keeping the nation alive.

Material:
Understanding of tolerance, archipelago concept, concept of Nation insight, national resilience, thought framework and certification of defense strategy politics, Defense concept of State and dual function of Armed Force, and defense system of the security of the people.

Reference:
9. Undang-undang Nomor 3 tahun 1946 tentang Kewarganegaraan dan Kependudukan Republik Indonesia
10. Other Internet sources
5. CIVIC EDUCATION

Learning Outcomes: LO 1 (S), LO 2 (M), LO 4 (L), LO 7 (S), LO 9 (S)

Description:
This course is in a group of Personality Development Courses (MPK). The course learning objectives consist of Basic Competencies and Learning Indicators. Basic Competence of Civic Education course is understanding Pancasila and its implementation, national identity and civil society, democracy, rights and obligations of citizens, constitution and rule of law, human rights, geopolitics, geostrategy, regional autonomy, good governance and globalization. Detailed Learning Indicators can be seen in the Course Lecture Unit (SAP).

Material:

Reference:

6. AIK I

Learning Outcomes: LO 1 (S), LO 2 (M), LO 8 (S), LO 11 (S)

Description:
Explain and discuss the Qur'an and Science about life, human, earth, and the universe. Explain and discuss Human and Religion which include: human status and function. Explain and discuss the role of Religion in human life. Explain and discuss about Aqidah Islamiyyah. The understanding and urgency of Tawheed, the discussion of Arkanul Iman, benefits the faithful. Explain and discuss about Shari'ah Islamiyyah which include: understanding of Shari'ah Islamiyyah, the source of Shari'ah Islamiyyah, the discussion about Arkanul Iman, mu'amalah. Explain and discuss the tenth Al-Islam that includes: understanding akhlakul karimah and akhlakul madsumumah. Kapita Selekt: The History of Islam.

Material:

Reference:
1. AIK I Book from University

7. ENGLISH FOR BIOLOGY

Learning Outcomes: LO 2 (M), LO 4 (S), LO 6 (S), LO 10 (S)

Description:
The course is designed to develop the students reading proficiency in English up to the intermediate level (approximately 5,000 words level).

**Materials:**
The comprehension of details, main ideas, literal, inferential, and evaluative comprehension of narrative, description, and expository types of texts.

**References:**

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8. **AIK II**

**Learning Out Comes:** LO 1 (S), LO 2 (M), LO 3 (L), LO 5 (S), LO 9 (S)

**Description:**
Being a faithful and devoted scientist and professional to the one and only God, having a noble character, and having a work ethic, as well as upholding the values of humanity and life.

**Material:**
Faith and devotion, Divine Philosophy (Theology); Human nature: Human dignity, Human responsibility; Law: Growing awareness to obey God's law, Prophetic function of religion in law Moral: Religion as a moral source, Noble attitude in life: Faith, science and deeds as a unity: Duty to demand and practice science, Responsibility of scientists and artists, Interreligionaris harmony, Religion as God's grace for all, Togetherness in religious plurality, Civilized and prosperous Society, Role of religious people in realizing civilized and prosperous society, Human Rights (Human rights) and democracy, academic culture, work ethic, open and fair attitude, religious contribution in political life, the role of religion in realizing unity of the nation.

**Reference:**
1. AIK I Book from University

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9. **TEACHING AND LEARNING**

**Learning Out Comes:** LO 2 (S), LO 5 (S), LO 9 (S)

**Description:**
Understanding the nature, basic principles, developments and problems of learning and learning of today's science.

**Material:**
Materials presented include learning theories: behaviorism, koknitisvisme, and humanism, as well as its development and implementation in science / Biology learning. Science learning models: information processing model (Gagne), cognitive model (Piaget), social learning model (Vigotsky and Bandura). Approaches in learning and competency-based approaches: fact approach, concept approach, environmental approach, constructivism approach, process skill approach, STS, contextual learning. The problem of multicultural learning in science learning in Europe and Indonesia.
Reference

<table>
<thead>
<tr>
<th><strong>10. Apprenticeship 1</strong></th>
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<tbody>
<tr>
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<tr>
<td>Description:</td>
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<tr>
<td>Field work lecture is a form of lecture in the form of apprenticeship in institutions / government agencies or business units managed by individuals / private.</td>
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<tr>
<td>Material:</td>
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<tr>
<td>Forms of practice undertaken by apprenticeship work in government institutions and / or private. In addition, students can conduct basic science research (Biology) that supports the development of applied sciences (life sciences) in research centers within a certain time and with the help of two counselors. After completing field study, the students prepare draft posters and / or written reports that are ready to be disseminated in the form of posters (=poster presentation).</td>
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<td>Reference:</td>
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<td>Based on problem</td>
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<th><strong>11. LEARNERS’ DEVELOPMENT</strong></th>
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<tr>
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<tr>
<td>Description:</td>
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<tr>
<td>Identify characteristics of physical and psychological development of learners according to the stage of school age and the implication in learning</td>
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<tr>
<td>Material</td>
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<td>Reference</td>
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</table>

**12. BOTANY**

**Learning Out Comes:** LO 2 (S), LO 3 (M), LO 5 (M), LO 9 (S)

**Description:**
Ability to analyze structural and vascular plant part functions through literature study and observation, in order students: Understand that there is a relationship between the structure (outside and within) the plant part with its function, and can analyze carefully the relationship. Understand the growth / development of plant organs, and can observe them carefully. Understand the existence of various forms of plant parts and master terminology concerned with the last forms. Skilled in planting and scientific reporting and able to apply knowledge for various purposes.

**Material:**
The ability to remember and appreciate the work of others: the cell findings and the development of plant anatomy. Comparing parts of the plant body: organ, source and lateral bulge. Create a description of the structure and function of roots, stems, and leaves associated with photosynthesis. Create descriptions and analyze cell structure and function. Analyze the structure and function of the body in primary growth and secondary growth. Analyze the structure and function of the network: meristem, skin network system, basic network and carrier network. Analyzing, summarizing, estimating and communicating the structure and function of the body's constituents are related to its ecological conditions.

Forms of Life, including: Based on the length of his life, based on adjustments to the environment, based on how to survive against a less favorable machine. Plant Body Structure, including: Plant body parts, internal organization. Development of Plant Body, discuss about: Plant body origin, primary growth, secondary growth. Nutrients, including roots, stems, leaves Reproductive organs include: floral developmental structures, organogeneses, Morphogeneses, Sporogeneses, Embriogeneses, Polinasi, Germination, Dissolution, Collection, Identification.

**Reference: Main**

**Supporting Reference**

### 13. ENGLISH FOR BIOLOGY II

**Learning Out Comes:** LO 2 (L), LO 3 (M), LO 4 (Vs), LO 7 (S), LO 11 (S)

**Description:**
Develop the students reading proficiency in English up to post intermediate level (approximately 6,000 words level)

**Materials:**
It is needed the students’ comprehension of details, main ideas, and simple rethoric structures of texts, literal, inferential and evaluative comprehension of expository, narative, descriptive, and argumentative types of texts preferred.

**References:**

### 14. MICROBIOLOGY & PARASITOLOGY

**Learning Out Comes:** LO 2 (S), LO 5 (L), LO 6 (S), LO 9 (S)

**Description:**
It is a compulsory course with a weight of 4 credits (2 credits of theory and 2 credits of practicum) and with the prerequisite of taking the General Biology course (MAB 4140) and Biochemistry and Instrumentation (MAK 4239) Microorganisms are widespread in nature and playing a very important role in the environment / ecosystem. To understand the role of microbes in human life and other organisms as well as in the ecosystem, it must recognize microbial biodiversity with its characteristics and characteristics and understand its metabolism, genetics and growth so that microbes can be developed for various purposes that are beneficial to human life and environmental preservation.

**Material:**
The scope and history of microBiology, The introduction of microbial diversity and its role in the life of organisms, Structures and functions of prokaryotic and eukaryotic microbes, nutrients and transport of trans membrane nutrition, metabolism and microbial growth, microbial genetics, microbial engineering / biotechnology, species, evolution and systematic concepts microbial and microbial applications.

**References:**

### 15. MEDIA AND LEARNING SOURCE

**Learning Out Comes:** LO 2 (M), LO 3 (S), LO 7 (S), LO 9 (S)

**Description:**

Students are able to understand the nature of science and learning along with the comprehensive design of science learning as the main provision in conducting active, innovative, creative, effective, and meaningful teaching of science for learners.

**Material:**

The subject of science education is a discipline that equips students of Biology Education Department in implementing science learning process in primary and secondary education. Through this course, students are expected to be able to design an active, innovative, effective, and meaningful learning process for students. Therefore, this course consists of the following materials: The Nature of Science, The Nature of Science Lesson, Theories of Science Lesson, Approaches in Science Lesson, Science Learning Models, Assessment in Science Lesson Planning of Science Media Learning. It is expected that all the materials in this subject will be able to form the framework of student thinking as a candidate educator in primary and secondary education.

**Reference**

1. Elementary School Nature Science: Srini M. Iskandar
2. Nature Science Education: Usman Samatowa
3. Nature Science Education: self learning material UPI
4. Asyiknya meneliti Sains jilid 1, 2, and 3: Dr. Tik L. Liem

Internet Browsing

### 16. LEARNING STRATEGY

**Learning Out Comes:** LO 4 (S), LO 5 (S), LO 9 (S)

**Description:**

This course provides students with prospective teachers with the knowledge, experience, abilities and skills to choose and apply efficient and effective learning strategies.

**Material:**

These lecture materials cover the essence of Biology, School Biology, IQ & EQ, Biology Learning Psychology, Approach-Models-Methods of Biology Learning Techniques, Basic Teaching Skills, Biology Learning Media, Classroom Management and Interaction.

**References:**


17. BIOCHEMISTRY
Learning Out Comes: LO 2 (S), LO 5 (S), LO 10 (S)
Description:
In order for students to know the chemical reactions that occur in living matter and the resulting products.
Material:
Chemical properties of proteins; chemical properties of antibodies, enzymes, quantization of chemicals; chemical processes in cells; testing of chemical components and nutrient content in materials; changes in compounds formed in the fermentation process, metabolism of carbohydrates, fats, amino acids and proteins, nucleic acids; genetic information and biotechnology.
Reference:
6. Browsing Internet

18. STATISTICS
Learning Out Comes: LO 2 (S), LO 6 (M), LO 8 (S), LO 11 (S)
Description
Explain and discuss the basic principles and kinds of experimental design, hypothesis testing, variance test, treatment design. Correlation and regression analysis (linear and non-linear) in the field of Biology. Probit analysis. Nonparametric statistical analysis. Processing data with static program package in PC.
Material:
Basic principles and kinds of experimental design, hypothesis testing, variance test, treatment design. Correlation and regression analysis (linear and non-linear) in the field of Biology. Probit analysis. Nonparametric statistical analysis. Processing data with static program package in PC.

References:

### 19. BIO ETHICS

**Learning Out Comes:** LO 3 (S), LO 5 (M), LO 6 (S), LO 9 (S)

**Description:**
This course is interdisciplinary pf applicative-theoretical course. After taking this course, students are expected to understand that Biotechnology is developed on the basis of the application of biological processes packaged in a particular 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 to build self-reliance in responding to policy issues and the implementation of biotechnology in human life. This course discusses and discusses the biological concepts underlying the development and application of Biotechnology in various aspects of human life.

**Material:**
The study begins with the understanding and basic principles of Biotechnology, the biological concepts underlying the development of Biotechnology, followed by discussions on the application of biotechnology in the field of food / beverage and pharmaceutical, medicine, agriculture, forestry, environment and energy resources.

**References:**

### 20. ZOOLOGY

**Learning Out Comes:** LO 1 (M), LO 1 (S), LO 3 (L), LO 5 (S), LO 10 (S)

**Description:**
- Students know and understand the general characteristics of animal members of invertebrate groups (protozoa to echinoderms) and their particular characteristics; identification and
classification of invertebrate animal species present in the surrounding environment; describes the livelihood, habitat, dispersal and common interests of examples of invertebrate phyla.

- Students know and understand the general characteristics and characteristics of chordata and vertebrate animals; identify and classify vertebrate animals; describes the livelihood, habitat, spread, and importance of chordata and vertebrate animals to humans.

**Material:**

- Animal Biology of members of phylum, protozoa, porifera, coelenterate, plathyhelminthes, nemathelminthes, annelids, molluscs, arthropods and echinoderms; as well as its spread.
- Animal Biology of hemichordata, urochordata, cephalochordata, agnatha, chordrichthyes, osreichtyes, amphibians, reptiles, aves, and mammals, and their spread.

**Reference:**

7. Internet Browsing

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### 21. LABORATORIUM SCIENCE

**Learning Out Comes:** LO 2 (S), LO 5 (L), LO 8 (S), LO 9 (S)

**Description:**

This course is designed and designed to equip students to master the mastery of materials and skills in managing the science laboratory.

**Material**

The main subjects of this course are on laboratory design, laboratory management, laboratory work, usability and use of basic tools that can be used in biological laboratories, laboratory materials, laboratory techniques (making preserves, cultures, microscopic preparations, fresh preparations, and preparations regarding the nature of the ingredients).

**References:**


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### 22. APPRENTICESHIP 2

**Learning Out Comes:** LO 3 (S), LO 4 (M), LO 7 (S), LO 9 (S), LO 10 (L)

**Description:**
The Internship Course is a Limited Choice Course (MKPT) that directs the learning process for the students to be directly involved in the service process in the specific field required for completion of the project development at the Consultant / Bureau / Institution / Apprentice. Students are allowed to choose the field of work of interest and adjusted to the opportunities / opportunities that are existed in the field.

**Material:**
This stage is an advanced stage of the previous apprenticeship. At this stage, student activities focus on direct observation of school culture. Through activities at this stage, students are expected to have knowledge related to school management, curriculum, facilities, student activities, and counseling services

**Reference:**
Based on the needs.

### 23. ECOLOGY

**Learning Outcomes:** LO 1 (L), LO 2 (S), LO 5 (S), LO 7 (M), LO 9 (S)

**Description:**
Explain and discuss the understanding and scope of Ecology from the organizational level of Population to Ecosystem. Describe and analyze the characteristics of population, community, interpopulation, abiotic factors, interactions between biotic factors and abiotic factors, chains and food webs, ecosystems and energy flows.

**Material:**

**References:**

<table>
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<tr>
<th>24. LEARNING EVALUATION</th>
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<td><strong>Learning Out Comes:</strong> LO 3 (S), LO 5 (S), LO 9 (S)</td>
</tr>
<tr>
<td><strong>Description:</strong> Understand the principles of educational evaluation and be able to apply alternative assessments for measurement and assessment of learning outcomes.</td>
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<tr>
<td><strong>Reference</strong></td>
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<tr>
<td>4. Thorndike Robert and hagen Elizabet, 2009, Measurement and evaluation in psychologi and education, America, john wiley and sons, inc</td>
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<tr>
<th>25. MOLLECULAR CELL BIOLOGY</th>
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<td><strong>Learning Out Comes:</strong> LO 1 (S), LO 5 (S), LO 8 (M), LO 9 (S)</td>
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Description:
Explain and discuss about cells as experimental models, cellular and molecular cellular activity mechanisms.

Material:
1) Introduction: cells as experimental models, learning techniques, basic concepts of physical and chemical thinking in cell Biology, (2) experimental methods in cell Biology, (3) cell membranes, (4) intracellular transport molecules, (5) cytoskeleton and molecular mechanism of movement within the cell, (6) Cell signaling, (7) Cell Cycle: G1, G2, S, M (mitosis and meiosis), (8) cell proliferation, (9) cell death.

References:

### 26. HISTOLOGY

**Learning Outcomes:** LO 2 (S), LO 5 (M), LO 8 (S), LO 10 (S)

**Description:**
After completion of this lecture students are expected to know and be able to explain the basic structure of epithelial cells and tissues, true connective tissue, special connective tissue, bone, blood, muscle and nerves.

**Material:**
This course discussed about the introduction of body building elements, basic cell structure, metabolism in the cell and the four basic tissues of the human body. The next discussion discussed the basic structure of each basic human network with more detail.

**References:**

### 27. CURRICULUM STUDY

**Learning Outcomes:** LO 3 (S), LO 5 (S), LO 9 (S)

**Description:**
Develop student creativity in designing Biology learning strategy and able to implement on class situation according to character and variety of student culture.

**Material**

Reference

28. BIODIVERSITY

Learning Out Comes: LO 3 (S), LO 5 (S), LO 11 (S)

Description:
Biodiversity course is used for developing basic concepts in the field of Biodiversity that can be used to analize the grouping of living things. Distribution of space, systematics, ecological-economic benefits and potential changes in living things and its management.

Material:
Several topics in this course: (1) Introduction to Biodiversity Concepts (2) Biological Elements and Biodiversity (3) Genetic Diversity and Basic Concepts of Germplasm (4) Ecosystem, habitat and ecosystem diversity (5) Systematic and diversity (6), and species inventory (7) Diversity of species, center of species diversity (8) Diversity and Culture (9) Biodiversity use and economic value (10) Scarcity and species extinction (11) Biodiversity conservation and management (12) Biodiversity conservation strategies and policies.

References:

Description: ©2003/Softcover/464 pages Publication Date: June 2002
29. GENETICS

Learning Out Comes: LO 2 (S), LO 5 (S), LO 10 (S)

Description:
Describes and discusses the matter and the basics of the inheritance of traits, chromosomes and genetic material, changes in inherited matter of its properties and effects in the expression of genes and inheritance of the nature and genetic balance in the population.

Material:

References:

30. PHYSIOLOGY ANATOMY OF ANIMALS AND HUMAN

Learning Out Comes: LO 1 (M), LO 4 (M), LO 5 (M), LO 6 (L), LO 9 (S)

Description:
In order for students to understand the anatomy of physiology organ and system organ in humans and animals.

Material:
Motion System: skeletal and muscle, muscle contraction mechanism; Nervous system: neurophysiology, reflex activity, senses. Endocrine system: the mechanism of hormonal action and its control; Cardiovascular system: cardiac physiology, circulatory physiology; System Hemolimfe: blood, immune response, lymphoid tissue, physiology of hemotasis, blood type, blood homeostasis; Respiratory system: respiratory mechanism and its control, O2 transport, Bohr effect; Digestive System: the physiology of digestion, enzyme and absorption; Urinari system: urine formation, body fluid balance, electrolytes, and acid-base; Reproductive System: the physiology of the male and female reproductive system, hormonal regulation; Some disorders and diseases of each system.

Reference:
3. Internet Browsing
### 31. AIK III

**Learning Outcomes:** LO 1 (S), LO 7 (S), LO 11 (S)

**Description:**
After attending the course, students are expected to have: (1) ability to understand the main points of Islamic teachings; (2) the ability to apply the teachings of Islam as a source of value and the foundation of thinking and behaving in the science and professions involved; and (3) the ability to solve basic religious problems in everyday life.

**Material:**
This course discussed the material about the Meaning, Purpose, and Methodology of Understanding Islam; Human, Religion, and Islam; Al-Qur'an: First Source of Islamic Teaching; Hadith: Second Source of Islamic Teaching; Ijtihad: Sources of Development of Islamic Law; Faith and Piety; Worship: Ritual Aspects of the Muslim Ummah; Building an Islamic Family; Food and Drink in Islam; Basic Concepts of Economics and Transactions in Islamic Muamalah System; Work Ethics and Entrepreneurship; Morals and Sufism; Da'wah and Amar Ma'ruf Nahyi Munkar; Islam and Contemporary Issues; and Shari'ah, Fiqh and Islamic Law

**Reference:**
1. AIK III Program Book from the University

### 32. MICROTECHNIQUE

**Learning Outcomes:** LO 3 (S), LO 5 (S), LO 10 (S)

**Description:**
Microtechnique course provides knowledge and explanation about the basic and theory and technical laboratory / practicum preparation histological preparation, the benefits of linkage with other disciplines that support the subject and provide technical skills for Biology students especially who study the problems / research related to the field structure / structure aspects.

**Material:**
Review of Introduction (scope and material targets and lecture contracts), Introduction of microtechnical laboratory equipment, Preparation of microscopic research materials from plants / animals, functions, objectives and effects of use of various reagents, how to create blocks and slicing and coloring, closure, plant preparation techniques, techniques of making microscopic preparations of animals.

**References:**

### 33. RESEARCH METHOD

**Learning Outcomes:** LO 4 (S), LO 8 (S), LO 11 (S)

**Procedural Description:**
Students are able to master the systematic and research methodology for education, both in qualitative and quantitative, skilled in conducting research for education, both in qualitative and quantitative.
Material
Topics include (1) problems and objectives of research, introduction (background, problems, objectives, hypotheses, assumptions, benefits of research, and operational affirmation, (2) theory, (3) qualitative and quantitative research methodologies, (4) (5) how to conclude, write suggestions, and verify research data, (7) systematic and use of research language (numbering system, citation writing / referring way, reference list / list writing); library, table writing, table of contents, list of images, and attachments The nature of research in the world of education Quantitative and qualitative research in education: characteristics, usefulness, and relevance of Class Action Research: characteristics, usefulness and implementation in learning MIPA education. Classroom Action Research: Individual and Collaborative Procedures for preparing Class Action Research proposal and drafting proposal.

Reference
4. Ihalauw John, 2005, Bangunan teori, Salatiga: UKSW
5. Suharsimi, 2002, Prosedure Penelitian, Jakarta: Rineka Cpta
8. Internet Browsing.

34. PHYSIOLOGY ANATOMY ON PLANTS

Learning Out Comes: LO 2 (S), LO 5 (S), LO 10 (S)

Description:
Discusses the relationship between structure, process and function in plants.

Material:
Understanding and scope of plant, water and vegetation physiology, transport of nutrients and water, transpiration, photosynthesis, translocation in phloem, respiration, nitrogen and lipid metabolism, mineral nutrient assimilation, secondary metabolite and plant defense, type and role of hormones in growth and development plants, mechanisms of motion in plants, phytochrome and light control on plant development, flowering control: photoperiodism and vernalization, physiology of stress.

Reference:

35. APPLIED BIOLOGY

Learning Out Comes: LO 2 (S), LO 5 (S), LO 7 (M), LO 9 (S)

Description:
This Applied Biology course discusses the principles of instructional media, the kinds of Biology learning media, the principle of modification, simplification, manipulation in making Biology learning media.

**Material:**
Assessing learning media, various Biology learning media, simplification principle, modification, and manipulation of media making, Biology study media design, presentation of Biology learning media design, making Biology learning media, evaluation of Biology learning media, exhibition organizer of Biology learning media

**Reference:**

**36. EVOLUTION**

**Learning Out Comes:** LO 3 (S), LO 5 (S), LO 10 (S)

**Deskripsi:**
Describes and discusses the notion of evolution, the theories of evolution and its development.

**Material:**
Describes and discusses the emergence of concepts and evolutionary evidences, species diversity and natural support in the organization of changes in living systems, natural evolution-based mechanisms of natural selection and linkages of survival adaptation and the formation of new species (Darwin's theory). Genetic variability and polymorphism in the discussion of the evolution of cells and molecules. Explain and discuss the following examples of animal and plant evolution in the population scale (species, genus, family and order) and individuals. Biogeography is related to evolution in the archipelago Archipelago. Relevance and application of evolutionary mechanisms in the development of culture and science and technology

**References:**

**37. TEACHING PLAN**

**Learning Out Comes:** LO 4 (S), LO 5 (S), LO 9 (S)

**Description:**
Students (1) master a variety of learning strategies in the field of Mathematics and Science, (2) skilled in making the design of Mathematics and Science lesson for each level of education.

**Material:**
Discussion topics include: (1) basic concepts of approaches, methods, and techniques of learning programs and their application, (2) the variety and strategies of learning Biology and their application, (3) learning appraisal techniques and strategies, and (4) alternative problem solving strategies learning in the field of mathematics and science education, (5) understanding and function of learning program plan in learning. Lesson Study Analysis: conformity with the development of science, technology, and society; material adjustment with methods, tools, media, time, and learning objectives, as well as student progress. Annual program and semester. Program unit format lesson / lesson plan / learning scenario. Procedures for the preparation of the teaching unit program and the assessment tool of the teaching program.

References:
8. Internet Browsing

38. AIK IV

Learning Out Comes: LO 1 (S), LO 4 (M), LO 6 (S), LO 10 (S)

Description:
This course is a general course / personality development given to all students on all department at the University.

Material:
In this lecture discussed material about Methodology in Understanding Islam; Human, Religion and Islam; Understanding Al-Quran; Hadith as a Source of Islamic Teachings; Ijtihad as the source and methodology of Islamic law; Tauhidullah: Living the Presence of God; Zikr, Prayer; Love, Morals, and Deeds; Amar Ma'ruf Nahyi Munkar and Jihad; The flow of theology in Islam; Concept of Education in Islam; The concept of forming a personal educator in Islam; and Family as the core vehicle in the realization of education.

Reference:
1. AIK IV program book from the University

39. DATA COMPUTATION

Learning Out Comes: LO 2 (S), LO 6 (S), LO 8 (M), LO 10 (M)

Description:
This course is to introduce and build a basic knowledge of statistics that includes descriptive statistics: data collection, organizing, recognizing and understanding patterns of data; opportunities, random
variables, distribution and expectation functions, discrete and continuous distributions, sampling techniques, hypothesis testing, regression, and anova. Students are expected to have skills in processing and analyzing data. Furthermore, participants have a logical knowledge and understanding of a problem based on factual data. Participants are also able to use statistical software as a computational tool, and able to read and interpret the computational results correctly.

Material:
Descriptive Statistics: Frequency distribution tables, cumulative distribution tables, contingency tables, bar and leaf charts, box-plots, histograms, selecting data transformations. Opportunity, distribution function: distribution function for one random variable, shared distribution function, conditional distribution function, cumulative distribution function, expectation and moment. Discrete distribution: binomial and poisson, continuous distributions: uniform, exponential, normal, t, χ2 and F, central limit argument, law of large numbers, sampling technique. Inference statistics for μ and σ2 for 1 population and 2 populations, simple linear regression method, least squares method, correlation, and anova.

References:

40. BIOTECHNOLOGY
Learning Out Comes: LO 4 (S), LO 5 (S), LO 9 (S)
Description:
This biotechnology course mainly explains biotechnology regarding: understanding of biotechnology, benefits, applications, and products produced.
Material:
Development of biotechnology in the future and its relation to other fields of science, Fermentation Model (Fermentation of closed system, continuous, and fed-batch), Physical and chemical environment parameters, Structure and type of fermentor, Achievement of aseptic conditions in fermentors, Stem cell definitions, Characteristics and Types Stem Cell Culture, Stem Cell Culture Application, Bioethics and Controversy on Stem Cell Use, Limitations and Classification of Bioinformatics, Application of Bioinformatics in the Field of Science, Medicine and Health
Reference:

41. KKN (SOCIETY SERVICE)
Learning Out Comes: LO 2 (L), LO 3 (M), LO 4 (S), LO 8 (S), LO 11 (S)
Description:
Explain the basic understanding of bioconservation, bioconservation applications in the field, develop the concept of rural environmental problem-solving planning and apply it in villages located in the core areas of conservation, evaluate outcomes, establish future plans for solving environmental problems in the area.

Material:
The basic understanding of bioconservation, bioconservation application in the field, preparing the concept of environmental problem-solving planning and applying it in the villages located in the target area of conservation, community approach, socioecology in the target area, Ranupani and surrounding areas, National Park area (TNBTS) and central area of porang plant (Sumber Bendo Village, Madiun Regency); as well as evaluating the results, establishing future plans for resolving environmental problems in the area.

Reference:
Based on the needs.

### 42. APPRENTICESHIP 3

**Learning Out Comes:** LO 3 (M), LO 4 (S), LO 7 (S), LO 9 (S), LO 10 (L)

**Description:**
With the holding of this apprenticeship activity is intended to achieve the objectives of which are: for students to improve the academic quality competence to be better prepared in facing the world of work, for students to improve the sense of crisis as part of the student label as agent of change, for lecturers to improve the capability and capacity to adapt to actual and factual issues in the field, for the apprenticeship institution will be a discuss and share space with academics on issues that occur in practice.

**Material:**
Apprenticeship is an integrated activity with courses in the form of observation / interview to school and teacher model to understand school culture and four teacher competence, including: personality, social and pedagogic competence in order to grow the interest to become teacher and also the formation of knowledge, skill, and attitude as a prospective teacher.

**Reference:**
Based on needs.

### 43. SLT (INTEGRATED FIELD STUDY)

**Learning Out Comes:** LO 3 (S), LO 4 (M), LO 6 (S), LO 10 (S), LO 11 (L)

**Description:**
The Manual for Integrated Field Study Procedure is the step that must be done in conducting the administration to conduct field study with the aim to increase students' insight into the application of certain subjects in real life. At the same time to know the various obstacles so that students can practice, analyze, and solve problems that occur in the field.

**Material:**
SLT activities become very important to do because it will be able to improve the quality, capability of graduate students of the department. Finally, for students who have completed the completion of all stages of the internship will be awarded a certificate as a form of appreciation in which the certificate is explained the quality value of the students being concerned.
44. BIOLOGY ENTREPRENEURSHIP

Learning Out Comes: LO 3 (S), LO 4 (M), LO 7 (S), LO 11 (S)

Description:
Describes and discusses the character of entrepreneurship, attitudes required by entrepreneurs, leadership and entrepreneur softskill, risk-taking, decision-making, business opportunities in Biology, business planning, and business economic analysis.

Material:
Entrepreneurial character, attitude required by entrepreneur, leadership and entrepreneur softskill, risk-taking, creativity and innovation, decision-making process, business opportunity in Biology, business planning, business economic analysis, business proposal formulation, resource use and opportunity assessment market. Practices and entrepreneurial simulations. Test entrepreneurial products.

References:

45. BAHASA INDONESIA FOR BIOLOGY

Learning Out Comes: LO 2 (M), LO 4 (S), LO 8 (S), LO 9 (S)

Description:
Explain and discuss the use of Indonesian which is emphasized on the ability to understand scientific readings especially in the field of Biology and the addition of vocabulary and expression in Indonesian standardized language. The structure of the sentence (grammar) is given according to the scientific reading.

Material:
The use of this course is emphasized on the ability to understand scientific readings especially in the field of Biology and the addition of vocabulary and expression in Indonesian standardized language. The structure of the sentence (grammar) is given according to the scientific reading.

Reference:
2. Pusat Pembinaan dan Pengembangan Bahasa Departemen Dikbud 1979, Pedoman Umum Ejaan Bahasa Indonesia yang Disempurnakan, Jakarta PN. Balai pustaka
46. PROPOSAL SEMINAR

Learning Out Comes: LO 3 (M), LO 4 (S), LO 6 (S), LO 9 (S)

Description:
This course can be followed by students who have prepared or are preparing a thesis research proposal. Furthermore, students present their proposal of the skripsi openly in front of other students, supervisors and examiners. Students must participate actively in each seminar thesis proposal to improve scientific presentation skills.

Material:
Studies of literature in accordance with thesis topics. Presentation of thesis proposal orally in front of students, supervisors and examiners. Various topics / titles seminar proposal thesis for each student programming seminar proposal of thesis proposal.

Reference:
Based on needs.

47. SCIENTIFIC ARTICLE WRITING

Learning Out Comes: LO 3 (M), LO 4 (S), LO 6 (S), LO 7 (L), LO 9 (S)

Description:
After following this course, the students are expected to be able to carry out research, which is to prepare research proposal, conduct research and prepare research report. This is done after understanding the principles and procedures in research and can understand and utilize the results of research of others in their field.

Material:
Knowledge base, Scientific approach, Research nature, Research problem, Proposed research, Library study, Research variables, Hypothesis, Research design, Data collection research, Analysis of research data, Research reports.

Reference:
4. Internet Browsing

48. EMBRYOLOGY & ANIMAL REPRODUCTION

Learning Out Comes: LO 2 (S), LO 5 (S), LO 10 (S)

Description:
Animal Embryology is a course that reveals the origin of an animal's origin, to understand this problem begins by recognizing the means and infrastructure for the occurrence of embryo, the means and infrastructure is the male and female reproductive system. In the male reproductive system, the testes as sex glands produce male sex cells or spermatozoa and in the female ovaries as female sex glands that produce ova or eggs. Gametogenesis as a step of the process of ripening of kelmin cells from diploid genital cells (2n Chromosomes) becomes haploid (n Chromosomes). Fertilization as a process of the union of both sex cells males and females that produce zygote, this zygote multiply so that the cell is shaped like a mulberry named Morula stadium. These cells will be differentiated and further in the next stage of Blastula, Gastrula, Tubulation and Organogenesis or levels of organ formation. These organisms will form new animals.

**Material:**
The material to be taught is Introduction, Gametogenesis, Fertilization, Mitosis, Blastulasi, Gastrula, Tubulation, Organogenesis.

**References:**
1. Langman, J., 2006, Embriologi Kedokteran, Jakarta, EGC
5. Tatang, D., 2011, Embriologi Perbandingan, Bandung, Armico

**49. THESIS**

**Learning Out Comes:** LO 2 (L), LO 3 (M), LO 4 (S), LO 6 (S), LO 10 (S), LO 11 (M)

**Description:**
Conduct research according to the proposal. Conducting data analysis and interpretation of research results. Prepare research report in the form of thesis and defend it in thesis exam.

**Material:**
Conducting research in accordance with the proposal, perform data analysis and interpretation of research results, present the results of research and compile reports research results in the form of thesis and defend it in the thesis exam.

**Reference:**
Based on needs.