

SYLLABUS:

Date / Revision	23 May 2015 / 02 May 2017 / PP
Faculty	Life Sciences (LS)
Study Programs	Biomedical Engineering (BME), Chemical Engineering (CHE), Food Technology (FTE)

SUBJECT: Biology

1 Basic Information

1.01	Subject Name	Biology
1.02	Semester	1
1.03	Level	1
1.04	SKS	3
1.05	Mandatory / Curriculum	D-02
1.06	Subject Code	BIOL
1.07	Subject Code	BME-FTE-CHE-D-LS-117
1.08	Year	2017 (7)
1.09	Quality Control	Final Test, OFSE, see evaluation
1.10	Limitations	Min 12 and Max 32 students in one class
1.11	Combined with	All Faculty of Life Sciences Students
1.12	Pre-requisite	-
1.13	Responsible	Dr. Tutun Nugraha
1.14	Revision	15-05-2017/pp

2 Description of Subject

This course is intended to refresh student's biology knowledge that obtained in high school with some enriching and strengthening comprehension in some parts that become foundations for the next courses and in their way to reach their expertise as bachelor in bioprocess chemical engineering, food technology and bio medical engineering. The main topic will be cell and metabolism, genetics and biotechnology, plant cell, structure and functions and animal cell, structure and functions. The course will also highlight the current issues in biotechnology, bioprocess. The relation of this course with the next advanced courses will be declared and synchronized.

Since in understanding biology required long term memory about specific terms and definitions, then students will be required to develop summaries in a fun and interesting way so those summaries and memory notes will help them to memorize. To strengthen the memory, the course will challenge the students to use all knowledge in their memories for analyzing some popular facts. For example, the

possibilities of some science fictions that become a movie theme or some advance technologies or recent phenomena.

3 Objectives

This course provides the foundation in Biology that is necessary for students in Life Sciences Faculty. This course will provide basis for various upper year courses such as Biochemistry, and microbiology, as well as other applied courses that are relevant to the selected field chosen by students in the future. Various biotechnological development in methodology and applications will also find its foundation in the course of Biology.

4 Competency

After having the course, students are expected to:

- a) Have understanding of brief philosophy of life, science & technology and the relation of biology with chemistry, physic and mathematics as basic science
- b) Have the knowledge of Cell structure and functions
- c) Have the basic knowledge of cell metabolism pathways, feedback mechanism and current technology that manipulate cell metabolism pathways for tools in production process.
- d) Have understanding of the history and development of genetic science since Mendel to DNA
- e) Have the knowledge of biotechnology development and current issues
- f) Have understanding on plant cell, plant structure and plant potency in biodiversity as the basic for exploring herbs and traditional pharmaceutical products
- g) Have understanding on animal cell, animal structure and function for basic in learning anatomy and physiology, animal nutrition, excretion and circulation system for basic in learning food science and nutrition.

5 Learning Approach / Methodology

- Lectures/ Class contact (time-tabled) supplemented with interactive questions and answers to build the projects;
- Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing;
- Student Study Effort: homework/assignment; preparation for test/quizzes/ examination.
- Writing assignments/presentations

6 Evaluation

5.1	Absence maximum	25%
5.2	Participation in Discussion	5
5.3	Homework / Classwork/Report	15
5.4	Presentation /Simulation	-
5.5	Daily Quiz	20
5.6	Final Examination	60 Points
	Total	100 Points

7 Text Book and Reference

1	<p>Main Text Book:</p> <ul style="list-style-type: none"> Biology. (12th Edition) -Sylvia S Mader and Michael Windelspecht- Mc Graw Hill Education Estimated book price: Rp 320,000,-
2	<p>Supplemental Textbooks:</p> <ul style="list-style-type: none"> Campbell Biology. (10th Edition) - Jane B. Reece, Lisa A. Urry, Michael L. Cain, Steven A. Wasserman, Peter V. Minorsky, Robert B. Jackson- -Benjamin Cummings - Pearson Education, Inc (2013)

8 Content / Topics of Lecture

Week	Content/ Topics of Lecturing	Text Book Chapter	Remark
1	<p>The view of Life</p> <ul style="list-style-type: none"> Brief philosophy of life, science and technology. Chemistry of life; basic chemistry, the essence of water properties, organic chemistry and macromolecules. Assignment: (homework) developing summary and memory notes in a fun and interesting way. 	Lecture and Group discussions	1 x 1 x 50 min
1	<p>Cell, structure and function</p> <ul style="list-style-type: none"> Cell organelles and function, cell membrane and transport system through membrane Assignment: (homework) developing summary and memory notes in a fun and interesting way. Connected to previous lecture. (homework) preparation of presentation materials about specific subject in this lecture 	Lecture and Group discussions	1 x 2 x 50 min
2	<p>Cell, metabolism pathways and feedback mechanism</p> <ul style="list-style-type: none"> Chloroplast, mitochondria, glycolysis, photosynthesis, Krebs cycle and Calvin cycle Assignment: (homework) developing summary and memory notes in a fun and interesting way. Connected to previous lecture. (homework) preparation of presentation materials about specific subject in this lecture 	Lecture and Group discussions	1 x 3 x 50 min
3	<p>Genetic, science in the earlier day</p> <ul style="list-style-type: none"> Cell reproduction, mitosis, meiosis, chromosomes, Mendel's law, genotype and phenotype, human trait that suit with Mendel's law and human genetic disorder. Assignment: (homework) developing summary and memory notes in a fun and interesting way. Connected to previous lecture. 	Lecture and Group discussions	1 x 3 x 50 min

4	<p>Genetic, development since DNA structure revelations</p> <ul style="list-style-type: none"> History of DNA and revelation of DNA structure, DNA transcription, protein translation. Assignment: (homework) developing summary and memory notes in a fun and interesting way. Connected to previous lecture. (homework) preparation of presentation materials about specific subject in this lecture 	Lecture and Group discussions	1 x 3 x 50 min
5	<p>Biotechnology</p> <ul style="list-style-type: none"> Tools in biotechnology (DNA sequencing and DNA cloning), Polymer Chain Reaction (PCR), microarray, stem cell. Assignment: collecting homework results, share and distribute each other summaries and memory notes. Discussing homework results 	Lecture & Group discussions	1 x 3 x 50 min
6	<p>Brief review in cell structure, metabolism and genetics</p> <ul style="list-style-type: none"> Brief review in cell structure, metabolism and genetics Assignment: <ul style="list-style-type: none"> (presentation); specific subject in “cell structure and function” (presentation); specific subject in “cell metabolism pathways and feedback mechanism” (presentation); specific subject in “genetic since early day and its development since DNA structure revelation” 	Student Presentation and group discussion	1 x 3 x 50 min
7	<p>Plant cell, structure and functions</p> <ul style="list-style-type: none"> Plants have a hierarchical organization consisting of organs, tissues, and cells growth, morphogen-nesis, and cell differentiation produce the plant body. Assignment: (homework) developing summary and memory notes in a fun and interesting way. Connected to previous lecture. (homework) preparation of presentation materials about specific subject in this lecture 	Lecture and Group discussions	1 x 3 x 50 min
8	Midterm Break		
9	<p>Plant nutrition, transport, control and growth response</p> <ul style="list-style-type: none"> Different mechanisms transport substances over short or long distances Plants nutrients elements and plants relationship with other organism. Assignment: (homework) developing summary and memory notes in a fun and interesting way. Connected to previous lecture. 	Lecture and Group discussions	1 x 3 x 50 min
10	<p>Animal nutrition, homeostasis and the immune system</p> <ul style="list-style-type: none"> animal’s diet must supply chemical energy, organic molecules, and essential nutrients. main stages of food processing are ingestion, digestion, absorption, and elimination. Assignment: (homework) developing summary and memory notes in a fun and interesting way. Connected to previous lecture. (homework) preparation of presentation materials about specific subject in this lecture 	Lecture and Group discussions	1 x 3 x 50 min

11	<p>Animal circulation system and respiration</p> <ul style="list-style-type: none"> • Circulatory systems, Coordinated cycles of heart contraction, Blood components function in exchange, transport, and Defense. Gas exchange occurs across specialized respiratory surfaces. Breathing ventilates the lungs. • Assignment: (homework) developing summary and memory notes in a fun and interesting way. Connected to previous lecture. • (homework) preparation of presentation materials about specific subject in this lecture 	Lecture and Group discussions	1 x 3 x 50 min
12	<p>Animal neuron and nervous system</p> <ul style="list-style-type: none"> • Neuron structure and organization reflect function in information transfer Neurons communicate with other cells at synapses. circuits of neurons and supporting cells. cerebral cortex controls voluntary movement and cognitive functions. • Assignment: (homework) developing summary and memory notes in a fun and interesting way. Connected to previous lecture. • (homework) preparation of presentation materials about specific subject in this lecture 	Lecture and Group discussions	1 x 3 x 50 min
13	<p>Animal neural sensory and environmental response</p> <ul style="list-style-type: none"> • Sensory receptors transducer stimulus energy. Mechanoreceptors. visual receptors • The senses of taste and smell rely on similar sets of sensory receptors • Assignment: collecting homework results, share and distribute each other summaries and memory notes. Discussing homework results. 	Lecture & Group discussions	1 x 3 x 50 min
14	<p>Brief review in plant and animal cell, structure and function.</p> <ul style="list-style-type: none"> • Assignment: • (presentation); specific subject in “plant cell, nutrition, transport, growth response and control” • (presentation); specific subject in “animal nutrition, circulation and respiration” • (presentation); specific subject in “animal neuron, neural system and neural sensory” 	Student Presentation and group discussion	1 x 3 x 50 min
15	Review/Evaluation		1 x 3 x 50 min
16, 17	Final Examination		