Module Description/Course Syllabi

Study Programme: Bachelor of Mathematics
Faculty of Mathematics and Natural Sciences
Universitas Andalas

1. *Course number and name*

MAT61246 Mathematics Biology

2. *Credits and contact hours/Number of ECTS credits allocated*

3 sks / 4,53 ECTS

3. *Instructors and course coordinator*

1. Dr. Arrival Rince Putri; 2. Dr. Ahmad Iqbal Baqi

4. *Text book, title, author, and year*

1. J.R. Chasnov, 2016, Mathematical Biology: Lecture Note, The Hong Kong University of Science and Technology
2. J.D. Murray, 2003, Mathematical Biology II: Spatial Models and Biomedical Applications, Springer

5. *Recommended reading and other learning resources/tools*

3. J. Stewart and T Day, 2015, Biocalculus: Calculus for the life sciences, USA

6. *Specific course information*

A. Brief description of the content of the course (catalog description)

In this course, we discuss Population Genetics, including Mendel's First and Second Laws, the Hardy-Weinberg Principle, and the Inbreeding Coefficient, as well as models of gene frequency changes in populations due to migration, mutation, and selection. Following that, we cover population dynamics, such as the Malthusian growth model, logistic growth model, species competition model, and

the Lotka-Volterra predator-prey model. Finally, the course includes material on disease spread models. To demonstrate the application of theories taught during the lectures and to introduce students to basic research, this course includes a group project assignment. This project is an implementation of the lecture material, with topics derived from simple yet engaging real-world problems. It is hoped that this project assignment will foster students motivation to learn the course material while also enhancing their creativity in the learning process.
B. Prerequisites or co-requisites
1. Ordinary Differential Equations MAT61142 2. Introduction to Partial Diffrential Equations MAT62243
C. Indicate whether a required or elective course in the program
Elective
D. Level of course unit (according to EQF: first cycle Bachelor, second cycle Master)
First Cycle Bachelor
E. Year of study when the course unit is delivered (if applicable)
4th Year
F. Semester when the course unit is delivered
Odd Semester
G. Mode of delivery (face-to-face, distance learning)
Face to face
7. *Intended Learning Outcomes*

ILO-4: An ability to use concepts and fundamental techniques of mathematics in solving simple mathematical problems. PI-1: An ability to choose proper basic mathematical concepts and techniques in solving simple mathematical problems; PI-2: An ability to illustrate simple mathematical problems based on appropriate basic mathematical concepts and techniques; PI-3: An ability to solve simple mathematical problems using the proper concept and mathematical fundamental techniques.
ILO 6: Have ability in data literacy and technology and can apply them in solving simple mathematical problems or other relevant fields. PI-1: An ability to identify appropriate data and technology to solve simple mathematical problems or other fields; PI-2: An ability to use data and technology and apply them to complete simple mathematical statements or other fields; PI-3: An ability to process data using available technology on simple mathematical problems or other fields; PI-4: An ability to conclude and interpret the results of data processing for simple mathematical problems or other fields.
ILO 7: An ability to communicate effectively especially in the area of mathematics with diverse communities. PI-1: An ability to present ideas or study results orally, especially in the mathematical field; PI-2: An ability to present ideas or results of studies in writing, especially in the field of mathematics; PI-3: An ability to respond feedback that are given
ILO 8: An ability to work in a team PI-1: An ability to actively participate in a team with full responsibility; PI-2: An ability to respond well to any feedback in team; PI-3: An ability to complete tasks according to the set schedule; PI-4: An ability to adapt in team.
8. *Course Learning Outcomes*
1. Students will be able to construct mathematical models of population growth, species interactions, and the spread of infectious diseases based on established assumptions.
2. Students will be able to analyze population growth, species interactions, and the spread of infectious diseases.
3. Students will be able to understand and interpret natural phenomena and the behavior of living organisms, and effectively organize and present these concepts in an abstract form.

4. Students will be able to think critically, analytically, and innovatively, argue logically and systematically, and discuss their findings effectively.

9. *Brief list of topics to be covered*

1. Population Genetics: Mendel's First and Second Laws, Hardy-Weinberg Principle, and Inbreeding Coefficient.
2. Models of gene frequency changes in populations due to migration, mutation, and selection.
3. Population Dynamics: Malthusian growth model, logistic growth model, species competition model, Lotka-Volterra predator-prey model.
4. Disease spread models.

10. Learning and teaching methods

Small group discussion, PjBL, Directed Learning

11. Language of instruction

Bahasa and English

12. Assessment methods and criteria

Summative Assessment :
1. Assignments : 10%
2. Mid Test : 20%
3. Final Test : 20%
4. Project : 50%

Formative Assessment : -