Module Description/Course Syllabi

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

1. *Course number and name*

MAT62223   Introduction to Applied and Fractional Calculus

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

3 sks / 4,53 ECTS

3. *Instructors and course coordinator*

1. Efendi, M.Si

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

1. A.M. Mathai, HJ Haubold; An Introduction to the Fractional Calculus, John Wiley & Sons, Inc., 2017.

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

2. J.M. Kimeu; Fractional Calculus: Definitions and Applications, Master Thesis, 2009. Western Kentucky University

6. *Specific course information*

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

This course discusses Fractional Calculus . The lecture begins with definitions and theorems related to integrals and fractional derivatives developed by mathematicians Riemann and Liouville. The material discussed is History of Fractional Calculus, Definition of Fractional Calculus, Riemman Liovile Fractional Integrals. . After the mid-semester evaluation, Riemman Liovile

Fractional Derivatives and Fractional Differential Equations were introduced. Towards the end of the semester evaluation , participants will have the opportunity to study various applications of Fractional Calculus. To complement students' skills and abilities in communicating mathematically and using Maple software, towards the end of the semester they are given group collaboration assignments related to topics in Fractional Calculus

B. Prerequisites or co-requisites

Calculus 1

C. Indicate whether a required or elective course in the program

Required

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)

1Year

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-2: Possesses profound knowledge of the basic concept of mathematics. PI-1: Able to explain the basic concepts of mathematics;
PI-2: Able to provide examples that are relevant to the basic concepts of mathematics;
PI-3: Able to determine simple problem solutions using basic mathematical concepts.

ILO-3: An ability to identify, explain and generalize simple mathematics. PI-1: Able to identify simple math problems;
PI-2: Be able to explain simple math problems.

ILO-4: An ability to use concepts and fundamental techniques of mathematics in solving simple mathematical problems.
PI-1: Able to choose the right basic mathematical concepts and techniques in solving simple math problems;
PI-2: Able to illustrate simple mathematical problems based on appropriate basic mathematical concepts and techniques.

ILO 5: An ability to formally and correctly prove simple mathematical statements using facts and methods that have been studied.
PI-1: Be able to identify formal structures and forms of analogy in mathematics;
PI-2: Able to use facts and apply methods in proving simple mathematical statements;
PI-3: Able to present a rigorous proof of simple mathematical statements (with a trace and thorough).

8. *Course Learning Outcomes*

1. Students are able to understand the main idea of fractional calculus.
2. Students are able to calculate and analyze fractional integrals.
3. Students are able to calculate and analyze fractional derivatives
4. Students are able to calculate and analyze fractional differential equations.
5. Students are able to apply fractional calculus.
6. Students are able to communicate the results of their thoughts and work both orally and in writing.

9. *Brief list of topics to be covered*

1. Introduction
2. Riemann-Liovile Fractional Integrals
3. Riemann-Liovile Fractional Derivatives
4. Fractional Differential Equations
5, Application

10. *Learning and teaching methods*

Directed Learning, Teacher Center Learning

11. Language of instruction
Bahasa and English

12. Assessment methods and criteria
Summative Assessment : 1. Mid-term exam: 30% 2. Final exam: 40% 3. Quiz: 15% 4. Assignment: 15% **Formative Assessment**: