	Module Description/Course Syllabi
	Study Programme: Bachelor of Mathematics
	Faculty of Mathematics and Natural Sciences
	Universitas Andalas

1. *Course number and name*

MAT62247 Capita Selecta on Applied Mathematics 1

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

3 sks / 4,53 ECTS

3. *Instructors and course coordinator*

1. Prof. Dr. Muhafzan; 2. Dr. Noverina Alfiany

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

1. W. G. Kelley, A. C. Peterson, Difference Equations, Harcourt/Academic Press, USA, 2001
2. Galor Oded, Discrete Dynamical System, Springer, New York, 2007.

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

Saber Elaydi, An Introduction to Difference Equations, Springer, New York, 2005.

6. *Specific course information*

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

The core of this lecture is to discuss difference calculus, the definition and classification of difference equations. This is followed by an explanation of first-order and second-order difference equations, the derivation of solution methods, and some examples of their application in real problems. The next discussion is about higher-order difference equations and systems of linear difference equations.

It then discusses the concept of Z transformation and its application in solving linear difference equations. Finally, the qualitative behavior of the system of linear difference equations is discussed.

B. Prerequisites or co-requisites

MAT61142 Ordinary Differential Equation

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)

3rd year

F. Semester when the course unit is delivered

Even Semester

G. Mode of delivery (face-to-face, distance learning)

Face to face

7. Intended Learning Outcomes

ILO-1: Possesses a good ethics and integrity
    PI-2: Able to act in accordance with academic ethics
    PI-3: Able to act in accordance with academic integrity
ILO-2: Possesses profound knowledge of the basic concept mathematics
    PI-1: An ability to explain the basic concept mathematics
    PI-3: An ability to determine solution of the simple problems
        using the basic concept mathematics
ILO-3: An ability to identify, explain and generalise simple mathematical
    PI-1: An ability to identify simple mathematical problems
    PI-2: An ability to explain simple mathematical problems
    PI-3: An ability to generalise simple mathematical problems
ILO-4: An ability to use concept and fundamental technique of mathematics in
    solving simple mathematical problems
    PI-1: 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-5: An ability formally and correctly proves a simple mathematical statements
    using facts and methods that have been studied
    PI-1: An ability to identify the formal structures and analogy forms in
       mathematics
    PI-2: An ability to use fact and apply methods in proving simple
       mathematical statement
    PI-3: An ability to present simple mathematical statement proof rigorously
       (sequentially and conscientious)
    PI-4: An ability to conclude or interpret result of the proving
       simple mathematical statement
ILO-7: An ability to communicate effectively especially in the area of
    mathematics in with diverse communities
    PI-1: Able to convey ideas or study results orally, especially in the field of
       mathematics
    PI-2: Able to present ideas or study results in writing, especially in the field
       of mathematics
    PI-3: Able to respond to feedback given

8. *Course Learning Outcomes*

1. Students are able to explain the basic concepts of difference calculus.

2. Students are able to explain the basic concepts, initial value problems, solution of difference equations and identify the classification of difference equations

3.	Students are able to solve linear difference equations of various types with appropriate methods
4.	Students are able to understand the concept of Z transformation and its use to solve the linear difference equations.
5.	Students are able to understand Putzer's method for matrix powering and its use to solve the system of linear difference equations
6.	Students are able to understand the qualitative behavior of the linear difference equation systems and are able to use Matlab to study this behavior

9. Brief list of topics to be covered

Calculus difference, linear difference equations, system of linear difference equation, Z transformation and its use to sove the system of linear difference equation, Putzer's method for matrix powering and its use to solve the system of linear difference equation, the qualitative behavior of the linear difference equation systems, and the use of Matlab software to learn the qualitative behavior of the linear difference equation systems.

10. Learning and teaching methods

Directed Learning, Teacher Center Learning

11. Language of instruction

Indonesia and English

12. Assessment methods and criteria

Summative Assessment :
 1. Mid-term exam: 40%
2. Final exam: 40%
3. Assignment (home work): 20%