Module Description/Course Syllabi

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

1. *Course number and name*

MAT62246 Linear Control System

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. Budi Rudianto, M.Si

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

1. Hendricks, E., Jannerup, O., Sorensen, P. H., Linear Systems Control, Springer, 2008.
2. Ogata, K., Modern Control Engineering, Fourth Edition, Prentice Hall, New Jersey, 2002.

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

D'Azzo, J. J., Houpis, C. H., Sheldon, S. N., Linear Control System Analysis and Design with Matlab, Marcel Dekker, New York, 2003.

6. *Specific course information*

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

The core of this lecture is the analysis of control systems in state space, such as controllability, observability, stability, canonical form, realization, and pole placement. In addition, the use of Matlab applications to detect controllability, observability, and other aspects is also introduced.

B. Prerequisites or co-requisites
1. MAT61142 Ordinary Differential Equation 2. MAT61122 Calculus III
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

ILO-8: An ability to work in team
- PI-1: Able to actively participate in a team with full responsibility
- PI-2: Able to respond well to any feedback within the team
- PI-3: Able to complete tasks according to the set schedule
- PI-4: Able to adapt in a team

8. *Course Learning Outcomes*

1. Ability to recognize linear control system problems in various real phenomena
2. Mastering the basic aspects of the system of linear differential equations; such as the use of Laplace transform, determination of the state transition matrix and solving the system of linear differential equations
3. Mastering the modeling of physical systems in the form of state space models, transfer function models and block diagram models
4. Ability to analyze state space models; such as controllability, observability, canonical form, realizability and stability of linear system

5. Ability to poles assignment for linear system
6. Ablility to use Matlab applications to solve problems in linear control systems
9. *Brief list of topics to be covered*
Linear control system problems in some real phenomena; some basic aspects of systems of linear differential equations; modeling of physical systems in the form of state space models; controllability, observability, canonical form, realization and stability; pole placement for linear systems; use of Matlab applications to solve problems in linear control systems
10. Learning and teaching methods
Directed Learning, Project-Based Learning
11. Language of instruction
Indonesia and English

12. Assessment methods and criteria
Summative Assessment : 1. Mid-term exam: 20% 2. Final exam: 20% 3. Assignment (home work): 10% 4. Project : 50%