MINISTRY OF EDUCATION, CULTURE, RESEARCH, AND TECHNOLOGY
UNIVERSITAS NEGERI SURABAYA
FACULTY OF MATHEMATICS AND NATURAL SCIENCE
UNDERGRADUATE PROGRAM OF MATHEMATICS
Ketintang Campus, C8-C9 Buildings of FMIPA, Surabaya
Email: s1-mat@unesa.ac.id

Module Handbook

Module Name :	*Teori Sistem Kontrol* Control System Theory
Module level :	Bachelor degree/Undergraduate Program
Course Code :	4420103142
Abbreviation, if applicable:	-
Courses included in the module, if applicable:	Not Applicable
Semester/Term	7th/ fourth year
Module coordinator(s)	Dr. Abadi, M.Sc.
Lecturer(s):	Dr. Yusuf Fuad, M.App.Sc.
Language:	Bahasa Indonesia (Indonesian Language)
Classification within the curriculum:	~~Compulsory~~/ Elective
Teaching format/class hours per week during the semester:	3 contact hours of lectures (*sks* or credit unit*)
Workload :	3 x 50 minutes lectures, 3 x 60 minutes structured activity, and 3 x 60 minutes individual activity per week, 14 weeks per semester 119 total hours per semester ~ 4.77 ECTS**
Credit Unit:	3 credit unit (4.77 ECTS)
Requirements:	Real Analysis 1

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Learning goals/competencies:	**Knowledge (KNO-1:** Demonstrating mathematical knowledge and mathematical insight**)** CLO-1: Able to perform analysis-synthesis of techno-eco-entrepreneur-maths-based phenomena and model them into a system with or without control **Competence (COM-2:** Generating ideas used for completing mathematical tasks and to communicate them either in writing or orally, in accordance with scientific principles.**)** CLO-2: Have knowledge of the transfer function and the characteristics of the solution, with or without the Matlab program, of a techno-eco-entrepreneur-maths-based system with or without control, and the linearization, stability, controllability, and observability of a linear system with or without feedback, as well as able to demonstrate the response of simulation-based solutions as well as mathematical proofs. **Attitude and Social (SOC-1:** Working collaboratively and having social sensitivity (obligations as citizens and towards religion) and being able to bring change to a techno-ecopreneurship community) CLO-3: Able to perform a mathematical attitude and self-control in applying the concept of systems and control, based on techno-eco-entrepreneur-maths, independently or in groups, in the field of mathematics and non-mathematical fields.
Content	This course aims to conduct analysis-based studies so that they are skilled at modeling a techno-ecoentrepreneur-maths-based phenomenon into a dynamic system, and converting it into a state variable system with or without control. Understanding the concept of system and control is focused on, among others, classification of systems with or without control, transfer functions, response units, fundamental matrices, transition matrices, and system solutions. The discussion also discusses linearization, steady state, system properties based on system response and eigenvalues, as well as root locus to study stability, controllability, and observability with or without feedback, as well as skillfully applying them to a given condition. which is determined. Lecture activities are carried out in a student center with discussions, observations, project assignments, and presentations.

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Attribute Soft skill:	Active communication; Discipline; Collaboration; Responsibility; and Argumentation in class.
Study/exam achievements:	The final grade (*NA*) is calculated based on the following ratio:

Assessment Components	Percentage of contribution
Participation	20%
Assignment	30%
Mid-semester test	20%
Final semester test	30%

Grade conversion of 0-100 scale into 0-4 scale is set as below:

Letter	Number	Grade Interval
A	4,00	$85 \leq A \leq 100$
A-	3,75	$80 \leq A\text{-} < 85$
B+	3,50	$75 \leq B\text{+} < 80$
B	3,00	$70 \leq B < 75$
B-	2,75	$65 \leq B\text{-} < 70$
C+	2,50	$60 \leq C\text{+} < 65$
C	2,00	$55 \leq C < 60$
D	1,00	$40 \leq D < 55$
E	0,00	$0 \leq E < 40$

Learning Methods :	Student-centered approach; project-based learning; lecturer and discussion; and presentations (structured activities)
Form of Media:	Power point slides; video; worksheets, and textbooks

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Literature (primary references):	1. Ogata, K. 2010. *Modern Control Engineering (5th Edition)*. New Jersey: Pearson. 2. Olsder, G. J. 2010. *Mathematical System Theory (4th Edition)*. Delft: Delftse Uitgevers Maatschappij. 3. Fuad, Y. 2010. *Handout Teori Sistem dan Kontrol*. Jurusan Matematika FMIPA Unesa. 4. Lewis, S. 1995. *Optimal Control*. New York: John Wiley and Sons.
Notes:	*1 credit unit or *sks* in learning process = three periods consist of: (a) scheduled instruction in a classroom or laboratory (50 minutes); (b) structured activity (60 minutes); and (c) individual activity (60 minutes) according to the Regulation of Indonesia Ministry of Research, Technology, and Higher Education No. 44 Year 2015 jo. the Regulation of Indonesia Ministry of Research, Technology, and Higher Education No. 50 Year 2018.
	**1 credit unit or *sks* = 1.59 ECTS according to Rector Decree Of Universitas Negeri Surabaya No. 598/UN38/HK/AK/2019