Course – Handbook

Bachelor

in

Mechatronics Engineering - MTE
(Faculty of Engineering)

Academic Year 2017/18

DAAD Federal Ministry of Education and Research
Coordinator TECHNISCHE UNIVERSITÄT ILMENAU
PO Box 150, BSD CPA 15330
Tel. +62 21 50588000
+62 852 12318000
info@iuli.ac.id; www.iuli.ac.id
IULI – Eco Campus, The Breeze
Jl. BSD Grand Boulevard
BSD City 15345
Island of Java

Mechatronics Engineering

International University Liaison Indonesia

IULI-Eco-Campus “The Breeze”
Bumi Serpong Damai 15345
Island of Java / Indonesia

www.iuli.ac.id

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1. Description of the Mechatronics Engineering Course

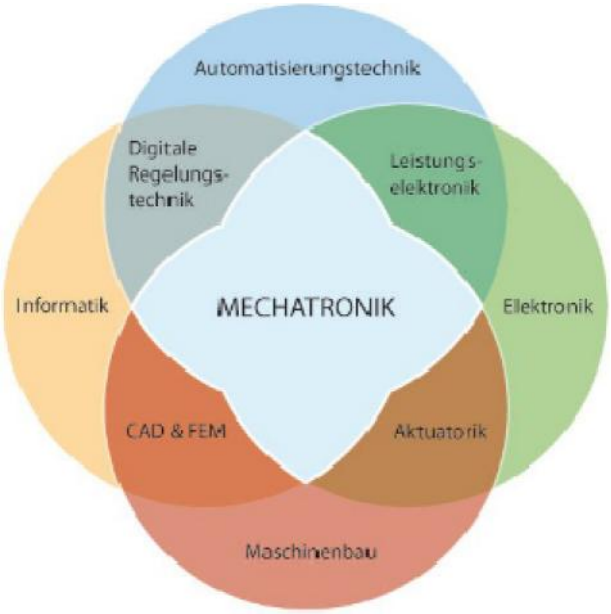

Abbildung 1: Mechatronics: synergetic integrations

Mechatronics is a synergistic integration of mechanical engineering, control theory, computer science, and electronics to manage complexity, uncertainty, and communication in engineered systems. Mechatronics is an exciting, "high-tech," and inherently multidisciplinary application, whose underlying concepts can be understood by practicing engineers from diverse academic backgrounds. The typical knowledge base for the design and operation of mechatronics systems comprises dynamic system modeling and analysis, decision and control theory, sensors and signal conditioning, actuators and power electronics, hardware interfacing, rapid control prototyping, and embedded computing.

This course will provide a balanced introduction to the theory, hardware, and software elements of mechatronics to students. The exposure to computer hardware/software for measurement and control will introduce the students to modern tools such as data acquisition and control boards, micro-controllers. Finally, planned project activities will enable the students to integrate measurement, control, computer hardware, and software components to develop prototype mechatronics systems.

The Bachelor of Science in Mechatronics Engineering curriculum is constructed to meet the demands of the current technology in the local and the global market. In the first year, the students will receive a solid foundation in the basic science, electrical engineering, programming technique and basic mechanical engineering. In the second year, the students have the opportunity during their practical training to have practical experience in a workshop to build basic skills (mechanical workbench, and sheet metal, welding, electrical and electronic workings), and also understand the fundamentals of mechanics (dynamics, kinematics and pneumatics), sensors and electronics.

Working familiarity in using a microcontroller, control technique and sensors/actuators will be achieved in the third year, as well as emphasizing the theory and practice of the hardware and software interfacing of microprocessors with analog and digital sensor/actuators. During the sixth semester, qualified students can do a practical internship abroad in order to understand better the working environment, the working process and the work ethics in another country. This new experience can help the students in the work market after they finish their study.

In their fourth year, the students are ready to express their ideas by building or designing a mechatronics system, to gain experience and proficiency in designing and assembling simple mechatronics sub-systems and systems; this project should cover mechatronics areas (mechanical, electrical/electronic systems, and computer science).

The students will be screened through an oral final study examination (OFSE), which is monitored by a neutral outsider observer.

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The students have to present and to defend their thesis work in front of members of the examination steering committee and external experts. This is a good preparation for them before they start real life in the industrial environment.

2. Qualification system in in Indonesia

2.1 General

IULI's bachelor's study program in Mechatronics Engineering can be completed after taking a minimum of 144 credit hours (Satuan Kredit Semester / SKS), offered in eight regular semesters.

An academic year at IULI consists of two regular semesters, plus optional short semester(s). The first regular semester starts in July and ends in December. The second semester starts in January and ends in June. The academic activities within a semester takes 16 weeks.

In a regular semester, 1 SKS of a course is equivalent to 1 hour lecturing, 1 hour structured learning (tutorial, homework or field trip) and 1 hour independent learning per week. Therefore, a student may enroll for between 20 and 24 SKS in each of semesters 1, 2, 3, 4, 5, and 7.

One semester is equivalent to 30 ECTS (European Credit Transfer System) or 1 SKS is approximately equivalent to 1,25 ECTS.

2.2 Scores (Refer to the Academic Regulations)

Grade Letter	Grade Wording	IULI	Indonesian Grade Points (GP)	Germany	Grade Description	Students represen-tation
A	Excellent	86-100	4	1	Outstanding performance	10%
B	Good	71 – 85	3,0 – 3,9	2	Performance is considerably higher than the average requirements	25%
C	Satisfactory	56 – 70	2,0 – 2,9	3	Performance meets the average requirements	30%
D	Poor	46 – 59	1,0 – 1,9	4	Performance is poor and likely to lead to failure	25%
F	Fail	< 45	0	5	Performance does not meet the minimum criteria. Considerable further work is required	10%

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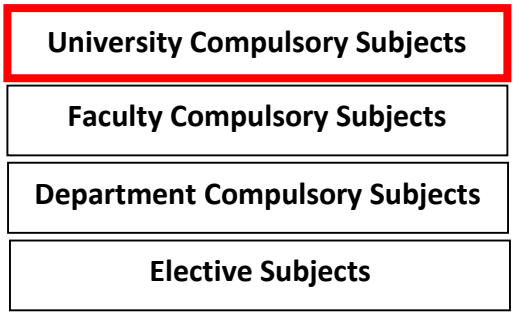
3. Course Contents, Progress and Organisation

3.1 Programm Structure (Four Years)



3.1.1 University Compulsory Subjects (in SKS)

	Subjects	Abr.	1	2	3	4	5	6	7	8	Total
1	English	ENGL	2	2	2	2	1	1			10
2	Fundamental of Computer Sciences	FCOM	2								2
3	Database, e-Commerce & Docs	ECOM						2			2
4	Environmental Engineering	ENVI			2						2
5	Innovation and Product Develop.	PROD					2				2
6	Descriptive Statistics	MATH				2					2
7	Internship	INSP								3	3
8	Research-, Methodology and - Semester	RESC						2	6		8
9	Ethics and Religious Philosophy	GENR					2				2
10	Civics	GENR				2					2
11	Indonesian Language and Culture	GENR						2			2
12	Pancasila	GENR		2							2
13	Oral Final Study Examination	OFSE						0			0
14	Thesis / Thesis Defense	THES								6	6
	Total		**4**	**4**	**4**	**6**	**5**	**7**	**6**	**9**	**45**

3.1.2 Faculty Compulsory Subjects (in SKS)

	Subjects	Abr.	1	2	3	4	5	6	7	8	Total
1	Applied Chemistry & Material Sci.	ACMS	3								3
2	Calculus and Linear Algebra	MATH	3	3							6
3	Physics and Laboratory	PHYS	4	4							8
4	Algoririthm, Programming % Datastr	PROG	3	3							6
5	Technical Drawing	TDRW	3								3
6	Manufacturing Processes & Systems	MFGS		2							2
7	Applied Mathematics	MATH			3						3
8	Elective in Engineering Science	EENG				2					2
9	Engineering Economy	EECO					2				2
10	Engineering Management	EMGT						2			2
	Total		**16**	**12**	**5**	**2**	**2**	**2**			**37**

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3.1.3 Department Compulsory Subjects (in SKS)

	Subjects	Abr.	1	2	3	4	5	6	7	8	Total
1	Introduction to Mechatronics Eng	IMTE	1								1
2	Basic Electric Circuit & Laboratory	ELEC	3	3							6
3	Statics and Mechanics of Materials	MECH		4					.		4
4	Electronic Devices and Circuits	ECED			3						3
5	Introduction to Measurement	MEAS			2						2
6	Machine Elements	MELM			3						3
8	Manufacturing Process Laboratory	MFGS			2						2
9	Thermo Fluid Science	THFL			2	2					4
10	Kinematics and Dynamics of Masch.	MECH				3					3
11	Sensor and Instrumentation Techn.	SENS			3						3
12	Microcontroller Systems & Interface	ECEC				3					3
13	Control Techniques	CTRL				3					3
14	Signals and Systems	SSYS				4					4
15	Introduction to Telecommunication	TCOM					2				2
16	Power Electronics	ECEP					3				3
17	Pneumatics and Hydraulics	PNEM					3	1			4
18	Mechatronics Systems Design	MSDG					3	3			6
19	Electric Machines & Electrc Drives	ELEC						2			2
20	Digital Signal Processing	DSPR						3			3
21	Mechatronics Elective Subjects	ELEC					6	6			12
	Total		**4**	**7**	**15**	**15**	**17**	**15**	**0**	**0**	**73**

3.1.4 Elective Subjects (in SKS)

	Subjects	Abr.	1	2	3	4	5	6	7	8	Total
1	German Language 1 *)	GERM	2	2	2	2	2	2			12
2	German Language 2 **)	GERM	2	2							4
3	Mandarin	MAND	2	2	2	2	2		2		12
4	Business Arabic	ARAB	2	2	2	2	2		2		12
5	Mechatroics Subjects	EMTE					6		6		12
6											
7											

*) Mandatory for Internship in Germany
**) Presemester Course (Final Exam in Germany)

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4. Study Plan (Four year program)

4.1 First year (Freshman)

	Code	Subject	SKS Le/Ex/La
	Semester 1		
1.1	ENGL-1100	English 1.	2/0/0
1.2	FCOM-1000	Fundamental of Computer Science	2/0/0
1.3	CHEM-1800	Applied Chemistry & Material Science	3/0/0
1.4	MATH-1110	Calculus & Linear Algebra 1	3/0/0
1.5	PHYS-1110	Physics 1 & Laboratory	3/0/1
1.6	PROG-1110	Algorithm, Programming and Data Structure 1	3/1/0
1.7	TDRW-1000	Technical Drawing	2/0/0
1.8	IMTE-1000	Introduction to Mechatronics Engineering	1/0/0
1.9	ELEC-1110	Basic Electric Circuit 1 (Lab)	2/0/1
1.10	GERM-1010*	German Language and Culture 1	2/0/0
		Total	**23/1/2**

	Code	Subject	SKS Le/Ex/La
	Semester 2		
2.1	ENGL-1120	English 2	2/0/0
2.2	GENR-1000	Pancasila	2/0/0
2.3	MATH-1120	Calculus & Linear Algebra 2	3/0/0
2.4	PHYS-1120	Physics 2 & Laboratory	3/0/1
2.5	PROG-1120	Algorithm, Programming and Data Structure 2	3/1/0
2.6	MFGS-1100	Manufacturing Processes and Systems	2/0/0
2.7	ELEC-1120	Basic Electric Circuit 2 (Lab)	2/0/1
2.8	MECH-1200	Statics & Mechanics of Materials	4/0/0
2.9	GERM-1020*	German Language and Culture 2	2/0/0
		Intentionally blanc	
		Total	**23/1/2**

*Mandatory for Internship in Germany

4.2 Second year (Sophomore)

	Code	Subject	SKS Le/Ex/La
	Semester 3		
3.1	ENGL-2130	English 3	2/0/0
3.2	ENVI-2000	Environmental Science	2/0/0
3.3	MATH-2200	Applied Mathematics	3/0/0
3.4	ELEC-2200	Electronic Device and Circuit	2/1/1
3.5	MEAS-2100	Introduction to Measurement	2/0/1
3.6	MELM-2100	Machine Elements	3/0/0
3.7	MFGS-1110	Manufactoring Process Labs	0/0/2
3.8	SENS-2100	Sensors, Instrumenta. & Measur.	2/1/1
3.9	THFL-2110	Thermo Fluid Science 1	2/0/0
3.10	GERM-2030*	German Language and Culture 3	2/0/0
		Total	**20/2/5**

	Code	Subject	SKS Le/Ex/La
	Semester 4		
4.1	ENGL-2140	English 4	2/0/0
4.2	MATH-2500	Destriptive Statistics	2/0/0
4.3	GENR-2300	Civics	2/0/0
4.4	THFL-2120	Thermo Fluid Science 2	2/0/0
4.5	EENG-2500	Elective Subject in Engineering Sci.	2/0/0
4.6	MECH-2300	Kinematics & Dynamics of Machines	3/0/0
4.7	ELEC-2300	Microcontroller systems & Interfaces	2/1/1
4.8	CTRL-2300	Control Technics	2/1/1
4.9	SSYS-2100	Signals and Systems	2/1/0
4.10	GERM-2040*	German Language and Culture 4	2/0/0
		Total	**21/3/2**

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4.3 Third Year (Junior)

	Code	Subject	SKS Le/Ex/La
	Semester 5		
5.1	ENGL-3150	English 5 (Technical English)	1/0/0
5.2	PROD-2100	Innovation and Product Dev.	2/1/0
5.3	GENR-3100	Ethics & Religious Philosophy	2/0/0
5.4	EECO-3100	Engineering Economy	2/0/0
5.5	TCOM-3100	Introduction to Telecom.	2/0/0
5.6	ELEC-3400	Power Electronics	2/0/1
5.7	PNEM-3110	Pneumatics & Hydraulics 1	2/0/1
5.8	MSDG-3010	Mechatronics System Design 1	3/1/0
5.9		**Specialization 1.1** - Elective Subject 1	3/0/1
5.10		**Specialization 1.2** - Elective Subject 2	3/0/0
		Intentionally blanc	
		Intentionally blanc	
	GERM-3050*	German Language and Culture 5	2/0/0
		Total	**23/2/3**

	Code	Subject	SKS Le/Ex/La
	Semester 6		
6.1	ENGL-3160	English 6 (Technical English)	1/0/0
6.2	ECOM-3100	Database, e-Commerce & Docs	2/0/0
6.3	RESC-3010	Research Methodology	2/0/0
6.4	GENR-3400	Indonesian Language & Culture	2/0/0
6.5	EMGT-3100	Engineering Management	2/0/0
6.6	PNEM-3120	Pneumatics & Hydraulics 2	1/0/1
6.7	MSDG-3020	Mechatronics System Design 2	2/1/0
6.8	ELEC-3500	Electric Machine and Drive	2/0/1
6.9		**Specialization 2.1** - Elective subject 3	3/0/1
6.10		**Specialization 2.2** - Elective Subject 4	3/1/0
6.11	DTSP-3100	Digital Signal Processing	2/1/0
6.12	OFSE-4000	Oral Final Study Examination	0/2/0
6.13	GERM-3060*	German Language and Culture 6	2/0/0
		Total	**24/5/3**

4.3.1 Specialization / Mechatronics Elective Subjects

	Code	Subject	SKS Le/Ex/La
	Elective Subject 1		
5.1	RTSY-3100	Real-Time Systems	1/0/0
5.2	PLCS-3100	Programmable Logic Controller	2/1/0
5.3	ARTI-3100	Artificial Intelligence	2/0/0
5.4	MCTT-3100	Machine Tool Technology	2/0/0
	Elective Subject 2		
5.1	MODL-3100	Mechatronics Modeling & Simul.	1/0/0
5.2	MEMS-3100	MEMS	2/1/0
5.3	CADS-3100	Computer Aided Design (CAD)	2/0/0
5.4	EMBS-3100	Embedded System Design	2/0/0

	Code	Subject	SKS Le/Ex/La
	Elective Subject 3		
6.1	MFAU-3200	Manufacturing Automation	3/0/0
6.2	FMSY-3200	Flexible Manufacturing Systems	3/0/0
6.3	ROBT-3200	Robotics	3/0/0
6.4	ENGG-3210	Ergonom. & Human Factor Eng.	3/0/0
	Elective Subject 4		
6.1	CVIS-3200	Computer Vision	3/0/0
6.2	DATA-3200	Industrial Data Communication	3/0/0
6.3	CAEM-3200	CAE & CAM	3/0/0
6.4	ENGG-3200	Maintenance Repair & Overhaul	3/0/0

4.4 Fourth Year (Senior)

	Code	Subject	SKS Le/Ex/La
	Semester 7		
7.2	RESC-4020	Research Semester in Germany	2/4/2
		Intentionally blanc	
		Total	**2/4/2**

	Code	Subject	SKS Le/Ex/La
	Semester 8		
8.1	THES-4010	Thesis	6/0/0
8.2	THES-4020	Thesis Defense	1/0/0
		Total	**7/0/0**

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