



Universitas Negeri Surabaya
Faculty of Engineering,
Mechanical Engineering Undergraduate Study Program

Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date																																																																																			
Mechanical Vibration	2120102023	Compulsory Curriculum Subjects - National	T=2	P=0	ECTS=3.18	4	April 28, 2023																																																																																			
AUTHORIZATION	SP Developer		Course Cluster Coordinator			Study Program Coordinator																																																																																				
	Mochamad Arif Irfa'i, S.Pd., M.T		Iskandar, ST, MT			Ir. Priyo Heru Adiwibowo, S.T., M.T.																																																																																				
Learning model	Case Studies																																																																																									
Program Learning Outcomes (PLO)	PLO study program that is charged to the course																																																																																									
	PLO-5	Work independently and in groups																																																																																								
	PLO-14	Science and engineering knowledge																																																																																								
	Program Objectives (PO)																																																																																									
	PO - 1	Students have good morals, ethics and personality when attending lectures.																																																																																								
	PO - 2	Students have knowledge about studying the classification of vibrations, free undamped vibrations with one degree of freedom, free damped vibrations, forced vibrations with one degree of freedom, transient vibrations, vibrations with two degrees of freedom and vibration control.																																																																																								
	PO - 3	Students are able to interact and work together in teams, think logically and intelligently in solving problems faced professionally in the field of mechanical vibrations.																																																																																								
	PLO-PO Matrix																																																																																									
		<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>P.O</td> <td>PLO-5</td> <td>PLO-14</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>PO-1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>PO-2</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>PO-3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>						P.O	PLO-5	PLO-14					PO-1							PO-2							PO-3																																																													
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PO Matrix at the end of each learning stage (Sub-PO)																																																																																										
	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td rowspan="2">P.O</td> <td colspan="16">Week</td> </tr> <tr> <td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td> </tr> <tr> <td>PO-1</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>PO-2</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>PO-3</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> </table>						P.O	Week																1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	PO-1																	PO-2																	PO-3																
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Short Course Description	Students will study the classification of vibrations, free undamped vibrations with one degree of freedom, free damped vibrations, forced vibrations with one degree of freedom, transient vibrations, vibrations with two degrees of freedom and control vibrations.																																																																																									
References	Main :																																																																																									

1. Bahan-bahan dari Internet dan kepustakaan lain
2. Rao S. S. 2000. Mechanical Vibrations 2nd edition. Wesley.
3. Kelly G. S. 2000. Fundamental of Mechanical Vibrations 2nd edition. McGraw-Hill.
4. W. Thomson. 1993. Theory of Vibration with Application 2nd edition. Prentice Hall.
5. P. Girdhar. 2004. Practical Machinery Vibration Analysis and Predictive Maintenance. Burlington: IDC Technologies.
6. D.J. Ewins. 2000. Modal Testing: Theory and Practice, 2nd Edition. New York: Research Studies Press Ltd.
7. R. K. Mobley. 1999. Vibration Fundamentals (Plant Engineering Maintenance (Hardback)). Boston: Butterworth and ash Heinemann.
8. Tungga B. K. 2010. Dasar-Dasar Getaran Mekanis. Yogyakarta: Penerbit ANDI

Supporters:

Supporting lecturer Iskandar, S.T., M.T.
Mochamad Arif Irfa'i, S.Pd., M.T.

Week-	Final abilities of each learning stage (Sub-PO)	Evaluation		Help Learning, Learning methods, Student Assignments, [Estimated time]		Learning materials [References]	Assessment Weight (%)
		Indicator	Criteria & Form	Offline (offline)	Online (online)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Basic concepts and Classification of vibrations	- Students understand the history of the development of mechanical vibrations	Form of Assessment : Participatory Activities, Portfolio Assessment	- Presentation, lecture, face to face - Question and Answer, Presentation 2 X 50	- Presentation, lecture, face to face - Question and Answer, Presentation 2 X 50	Material: History of the Development of Mechanical Vibration Reference: Tungga BK 2010. Basics of Mechanical Vibration. Yogyakarta: ANDI Publishers	6%
2	1. Basic Concepts of Vibration 2. Vibration Classification 3. Analysis procedure	- Students understand the basic concept of vibration along with its classification and analysis procedures	Criteria: Criteria: Understanding and Mastery Non-test form: Paper writing and presentation Form of Assessment : Participatory Activities, Portfolio Assessment	- Presentations, lectures, face to face - Questions and Answers 2 X 50	- Presentations, lectures, face to face - Questions and Answers 2 X 50	Material: Basic Concepts of Vibration Vibration Classification Analysis procedures References: Kelly GS 2000. Fundamentals of Mechanical Vibrations 2nd edition. McGraw-Hill.	6%
3	Vibration Element	1.- Students are able to understand the elements of vibration in the form of masses, springs and dampers 2.- Students are able to work on parallel series problems on vibration elements	Form of Assessment : Participatory Activities, Portfolio Assessment	- Presentations, lectures, face to face - Questions and Answers 2 X 50	- Presentations, lectures, face to face - Questions and Answers 2 X 50	Material: - the concept of an undamped one degree of freedom system Reference: Tungga BK 2010. Basics of Mechanical Vibration. Yogyakarta: ANDI Publishers	6%

4	Vibrations of one degree of freedom are undamped	- Students understand the concept of an undamped one degree of freedom system	Criteria: Criteria: Understanding and Mastery Non-test form: Paper writing and presentation Form of Assessment : Participatory Activities, Portfolio Assessment	- Presentations, lectures, face to face - Questions and Answers - Giving assignments 2 X 50	- Presentations, lectures, face to face - Questions and Answers - Giving assignments 2 X 50	Material: - The concept of an undamped one degree of freedom system Reference: <i>Tungga BK 2010. Basics of Mechanical Vibration. Yogyakarta: ANDI Publishers</i>	6%
5	- Vibrations of one degree of freedom are damped	- Students are able to understand the damped one degree of freedom system	Forms of Assessment : Participatory Activities, Portfolio Assessment, Tests	- Presentations, lectures, face to face - Questions and Answers 2 X 50	- Presentations, lectures, face to face - Questions and Answers 2 X 50	Material: damped one degree of freedom system References: <i>Tungga BK 2010. Basics of Mechanical Vibration. Yogyakarta: ANDI Publishers</i>	7%
6	- One degree of freedom vibration is damped in the rotation system	- Students understand the concept of damped one degree of freedom vibration in a rotational system	Form of Assessment : Participatory Activities	- Presentations, lectures, face to face - Questions and Answers 2 X 50	- Presentations, lectures, face to face - Questions and Answers 2 X 50	Material: concept of damped one degree of freedom vibration in a rotational system Reference: <i>Kelly GS 2000. Fundamentals of Mechanical Vibrations 2nd edition. McGraw-Hill.</i>	6%
7	- Harmonic Vibrations	- Students understand the concept of harmonic vibrations	Form of Assessment : Participatory Activities	- Presentations, lectures, face to face - Questions and Answers 2 X 50	- Presentations, lectures, face to face - Questions and Answers 2 X 50	Material: Concept of harmonic vibrations Reference: <i>Tungga BK 2010. Basics of Mechanical Vibrations. Yogyakarta: ANDI Publishers</i>	7%
8	material for meetings 1 to 7	master the material from meetings 1 to 7	Form of Assessment : Participatory Activities	written exam 2 X 50	Written Exam 2 X 50	Material: Material for meetings 1 to 6 References: <i>Tungga BK 2010. Basics of Mechanical Vibration. Yogyakarta: ANDI Publishers</i>	7%
9	- Explain the response to harmonic vibrations	- Students understand the concept of response to harmonic vibrations	Form of Assessment : Participatory Activities	- Presentations, lectures, face to face - Questions and Answers 2 X 50	- Presentations, lectures, face to face - Questions and Answers 2 X 50	Material: concept of response from harmonic vibrations Reference: <i>Tungga BK 2010. Basics of Mechanical Vibration. Yogyakarta: ANDI Publishers</i>	6%

10	Forced Vibration	- Students are able to know about forced vibrations	Form of Assessment : Participatory Activities	- Presentations, lectures, face to face - Questions and Answers 2 X 50	- Presentations, lectures, face to face - Questions and Answers 2 X 50	Material: Forced Vibrations Reference: Kelly GS 2000. <i>Fundamentals of Mechanical Vibrations 2nd edition. McGraw-Hill.</i>	6%
11	Forced Vibration with impact force	- Students understand the concept of forced vibration with impact force	Forms of Assessment : Participatory Activities, Portfolio Assessment, Tests	- Presentations, lectures, face to face - Questions and Answers 2 X 50	- Presentations, lectures, face to face - Questions and Answers 2 X 50	Material: Forced Vibration with impact force Reference: Rao SS 2000. <i>Mechanical Vibrations 2nd edition. Wesley.</i>	6%
12	Vibration of two degrees of freedom	- Students are able to understand the vibrations of two degrees of freedom	Form of Assessment : Participatory Activities, Portfolio Assessment	- Presentations, lectures, face to face - Questions and Answers 2 X 50	- Presentations, lectures, face to face - Questions and Answers 2 X 50	Material: Vibrations of two degrees of freedom Reference: Kelly GS 2000. <i>Fundamentals of Mechanical Vibrations 2nd edition. McGraw-Hill.</i>	6%
13	1.- Explain multi degree of freedom vibrations 2.- Derive the equation of motion	1.- Students understand the concept of multi-degree-of-freedom vibrations 2.- Students are able to derive the equations of motion	Forms of Assessment : Participatory Activities, Portfolio Assessment, Tests	- Presentations, lectures, face to face - Questions and Answers 2 X 50	- Presentations, lectures, face to face - Questions and Answers 2 X 50	Material: multi degree of freedom vibration concept Reference: Rao SS 2000. <i>Mechanical Vibrations 2nd edition. Wesley.</i> Material: equations of motion Reference: Kelly GS 2000. <i>Fundamentals of Mechanical Vibrations 2nd edition. McGraw-Hill.</i>	6%
14	Vibration Control	- Students are able to know how to control vibrations	Forms of Assessment : Participatory Activities, Portfolio Assessment, Tests	- Presentations, lectures, face to face - Questions and Answers 2 X 50	- Presentations, lectures, face to face - Questions and Answers 2 X 50	Material: Vibration Control Library: Kelly GS 2000. <i>Fundamentals of Mechanical Vibrations 2nd edition. McGraw-Hill.</i>	6%
15	- Vibration measurement	- Students know how to measure vibrations	Form of Assessment : Participatory Activities, Portfolio Assessment	- Presentations, lectures, face to face - Questions and Answers 2 X 50	- Presentations, lectures, face to face - Questions and Answers 2 X 50	Material: Vibration measurement Reference: Tungga BK 2010. <i>Basics of Mechanical Vibration.</i> Yogyakarta: ANDI Publishers	6%

16	Material for meetings 9 to 15		Form of Assessment : Participatory Activities, Portfolio Assessment	Written Exam 2 X 50	Written Exam 2 X 50	Material: Material from meetings 9 to 15 References: <i>Tungga BK 2010. Basics of Mechanical Vibration.</i> Yogyakarta: ANDI Publishers	7%
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Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	61.83%
2.	Portfolio Assessment	29.83%
3.	Test	8.33%
		99.99%

Notes

- Learning Outcomes of Study Program Graduates (PLO - Study Program)** are the abilities possessed by each Study Program graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of their study program obtained through the learning process.
- The PLO imposed on courses** are several learning outcomes of study program graduates (CPL-Study Program) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and knowledge.
- Program Objectives (PO)** are abilities that are specifically described from the PLO assigned to a course, and are specific to the study material or learning materials for that course.
- Subject Sub-PO (Sub-PO)** is a capability that is specifically described from the PO that can be measured or observed and is the final ability that is planned at each learning stage, and is specific to the learning material of the course.
- Indicators for assessing** ability in the process and student learning outcomes are specific and measurable statements that identify the ability or performance of student learning outcomes accompanied by evidence.
- Assessment Criteria** are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
- Forms of assessment:** test and non-test.
- Forms of learning:** Lecture, Response, Tutorial, Seminar or equivalent, Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Community Service and/or other equivalent forms of learning.
- Learning Methods:** Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent methods.
- Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
- The assessment weight** is the percentage of assessment of each sub-PO achievement whose size is proportional to the level of difficulty of achieving that sub-PO, and the total is 100%.
- TM=Face to face, PT=Structured assignments, BM=Independent study.