| | | | Document Code |
|---|---|---|---|
| **UNESA** | **Universitas Negeri Surabaya**<br>**Vocational Faculty,**<br>**D4 Mechanical Engineering Study Program** | | |

## SEMESTER LEARNING PLAN

| Courses | CODE | Course Family | Credit Weight | | | SEMESTER | Compilation Date |
|---|---|---|---|---|---|---|---|
| **Engineering Mechanics** | 99992140103022 | | **T=3** | **P=0** | **ECTS=4.77** | 1 | June 5, 2024 |

| AUTHORIZATION | SP Developer | Course Cluster Coordinator | Study Program Coordinator |
|---|---|---|---|
| | Dyah Riandadari, Dewi Puspitasari | Diah Wulandari, S.T., M.T | Arya Mahendra Sakti, S.T., M.T. |

| Learning model | **Case Studies** |
|---|---|

| **Program Learning Outcomes (PLO)** | **PLO study program which is charged to the course** | |
|---|---|---|
| | **PLO-9** | Able to apply knowledge of mathematics, science and/or materials, and engineering to gain a thorough understanding of engineering principles. |
| | **Program Objectives (PO)** | |
| | **PLO-PO Matrix** | |

| P.O | PLO-9 |
|---|---|

**PO Matrix at the end of each learning stage (Sub-PO)**

| P.O | Week | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |

| **Short Course Description** | This course provides an understanding of the properties of supports, analysis of normal forces, moments of trusses in certain static and statically indeterminate theories, tensile, compressive, shear, bending and torsion stresses, thermal, Hooke's law, elastic line equations, and diagram methods. Mohr's circle. |
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| **References** | **Main :** | |
|---|---|---|
| | 1. Paul D. Ronney, BASICS OF MECHANICAL ENGINEERING: INTEGRATING SCIENCE, TECHNOLOGY AND COMMON SENSE, 2021<br>2. Daniel W. Baker, William Haynes. Engineering Statics, 2024 | |
| | **Supporters:** | |
| | | |

| **Supporting lecturer** | Diah Wulandari, S.T., M.T.<br>Dyah Riandadari, S.T., M.T.<br>Ferly Isnomo Abdi, S.T., S.Pd., M.T.<br>Dewi Puspitasari, S.Pd., M.Sc. |
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| 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 | 1. Students are able to analyze the properties of supports and normal forces 2. Describe and analyze the results Describe the stress due to combined loads | 1. Explain the meaning of stress due to combined loads 2. Calculate the stress due to combined loads 3. Explain the results of combined stress calculations | **Criteria:** 1. Presence 2. Activeness in questions and answers, seriousness in attending lectures **Form of Assessment** : Participatory Activities, Portfolio Assessment | CeLecture discussion questions and answers exercises and assignments Lecture Case study, Discussion in groups Assignment-1: Calculating stress due to combination loads and calculating combination stress in beams friendly, discussion and questions and answers 3 X 50 | | | 1% |
|---|---|---|---|---|---|---|---|
| 2 | Continuing Meeting 1 | Decomposing forces in components. Determining the perpendicular components of a force, Adding forces by adding | **Criteria:** 1. Attendance 20% 2. Assignments, Presentations and Quizzes 30% 3. UTS 20% 4. UAS 30% | Lectures, discussions and questions and answers 3 X 50 | | | 0% |
| 3 | Know about the resultant forces in space | Understand the concept of force in the field of space. Describe the components of force in the field of space | **Criteria:** 1. Attendance 20% 2. Assignments, Presentations and Quizzes 30% 3. UTS 20% 4. UAS 30% | Lectures, discussions and questions and answers 3 X 50 | | | 0% |
| 4 | Know the center of gravity of plates and composites | Understand the concept of center of gravity of planes and lines. Understand the concept of center of gravity of planes and lines. Understand the center of gravity of plates and composites | **Criteria:** 1. Attendance 20% 2. Assignments, Presentations and Quizzes 30% 3. UTS 20% 4. UAS 30% | Lectures, discussions and questions and answers 3 X 50 | | | 0% |
| 5 | Students can determine the moment of inertia of a plane and the moment of inertia of a pole | Explaining the moment of inertia of a plane Explaining the moment of inertia of a pole | **Criteria:** 1. Attendance 20% 2. Assignments, Presentations and Quizzes 30% 3. UTS 20% 4. UAS 30% | Lectures, discussions and questions and answers 3 X 50 | | | 0% |
| 6 | Understand the concept of truss | Able to draw free body diagrams regarding the principles of force balance. Able to analyze the requirements for balance techniques | **Criteria:** 1. Attendance 20% 2. Assignments, Presentations and Quizzes 30% 3. UTS 20% 4. UAS 30% | Lectures, discussions and questions and answers 3 X 50 | | | 0% |

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| **7** | Understanding Cremona diagrams for flat frames | 1. Able to draw Cremona diagrams for flat frames<br>2. Able to determine external forces using the Cremona diagram<br>3. Able to determine internal forces using the Cremona diagram | **Criteria:**<br>1. Attendance 20%<br>2. Assignments, Presentations and Quizzes 30%<br>3. UTS 20%<br>4. UAS 30% | Lectures, discussions and questions and answers<br>3 X 50 | | | | 0% |
| **8** | Understand the Culman and Ritter intersection methods | 1. Be able to describe the Culman slice<br>2. Able to analyze the Culman section of the stem using the Culman section method<br>3. Be able to describe the Ritter slice<br>4. Able to analyze Ritter slices to determine rod forces in plane frame construction | **Criteria:**<br>1. Attendance 20%<br>2. Assignments, Presentations and Quizzes 30%<br>3. UTS 20%<br>4. UAS 30% | Lectures, discussions and questions and answers<br>3 X 50 | | | | 0% |
| **9** | Midterm exam | Doing questions in writing | **Criteria:**<br>Ability to take Midterm Exams | Take the Written Exam<br>3 X 50 | | | | 0% |
| **10** | Students are able to analyze the properties of supports and frame structures | Analyze the properties of supports and frame structures | **Criteria:**<br>1. Attendance 20%<br>2. Duty 30%<br>3. UTS 20%<br>4. UAS 30% | Lectures, discussions and questions and answers<br>3 X 50 | | | | 0% |
| **11** | Students are able to calculate the twisting moment | Students are able to calculate the twisting moment | **Criteria:**<br>1. Attendance 20%<br>2. Duty 30%<br>3. UTS 20%<br>4. UAS 30% | Lectures, discussions and questions and answers<br>3 X 50 | | | | 0% |
| **12** | Calculate tensile and compressive stress | Students are able to calculate tensile and compressive stresses | **Criteria:**<br>1. Attendance 20%<br>2. Duty 30%<br>3. UTS 20%<br>4. UAS 30% | Lectures, discussions and questions and answers<br>3 X 50 | | | | 0% |
| **13** | Students are able to analyze skeletal reactions in static and statically indeterminate theory | Students are able to analyze skeletal reactions in static and statically indeterminate theory | **Criteria:**<br>1. Attendance 20%<br>2. Duty 30%<br>3. UTS 20%<br>4. UAS 30% | Lectures, discussions and questions and answers<br>3 X 50 | | | | 0% |

| 14 | Analyzing shear and thermal stress | 1.Students are able to analyze shear stress 2.Students are able to analyze thermal stress | **Criteria:** 1.Attendance 20% 2.Duty 30% 3.UTS 20% 4.UAS 30% | Lectures, discussions and questions and answers 3 X 50 | | | 0% |
|---|---|---|---|---|---|---|---|
| 15 | Determine the stress-strain relationship in Hooke's law and the elastic line equation | Students are able to determine the stress-strain relationship in Hooke's law and the elastic line equation | **Criteria:** 1.Attendance 20% 2.Duty 30% 3.UTS 20% 4.UAS 30% | Lectures, discussions and questions and answers 3 X 50 | | | 0% |
| 16 | FINAL EXAMS | FINAL EXAMS | **Criteria:** Ability to take Final Semester Exams | Do the questions in writing 3 X 50 | | | 0% |

**Evaluation Percentage Recap: Case Study**

| No | Evaluation | Percentage |
|---|---|---|
| 1. | Participatory Activities | 0.5% |
| 2. | Portfolio Assessment | 0.5% |
| | | 1% |

**Notes**

1. **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.
2. **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.
3. **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.
4. **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.
5. **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.
6. **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.
7. **Forms of assessment:** test and non-test.
8. **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.
9. **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.
10. **Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
11. **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%.
12. TM=Face to face, PT=Structured assignments, BM=Independent study.