



**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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|--|---|--|------------------------------|-----|--------|---|---|----|------|----|----|----|----|------|------|--|--|--|------|--|--|--|--|--|--|--|--|--|--|--|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Engineering drawings | 2120102128 | | T=2 P=0 ECTS=3.18 | 1 | January 3, 2022 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AUTHORIZATION | | SP Developer | Course Cluster Coordinator | Study Program Coordinator | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Akhmad Hafizh Ainur Rasyid, Diastian Vinaya Wijanarko | Agung Pijo Budijono, S.T., M.T. | Ir. Priyo Heru Adiwibowo, S.T., M.T. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Learning model | Project Based Learning | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Program Learning Outcomes (PLO) | PLO study program that is charged to the course | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | PLO-14 | Science and engineering knowledge | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Program Objectives (PO) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | PO - 1 | Able to make real objects into images | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | PO - 2 | Able to plan images | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | PO - 3 | Skilled in using drawing equipment | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | PLO-PO Matrix | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>P.O</th> <th colspan="4">PLO-14</th> </tr> </thead> <tbody> <tr> <td>PO-1</td> <td></td><td></td><td></td><td></td> </tr> <tr> <td>PO-2</td> <td></td><td></td><td></td><td></td> </tr> <tr> <td>PO-3</td> <td></td><td></td><td></td><td></td> </tr> </tbody> </table> | | | | P.O | PLO-14 | | | | PO-1 | | | | | PO-2 | | | | | PO-3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | P.O | PLO-14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | PO-1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PO-2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PO-3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PO Matrix at the end of each learning stage (Sub-PO) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2">P.O</th> <th colspan="16">Week</th> </tr> <tr> <th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th><th>9</th><th>10</th><th>11</th><th>12</th><th>13</th><th>14</th><th>15</th><th>16</th> </tr> </thead> <tbody> <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> </tbody> </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 | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Short Course Description | In this course students learn about making pictures from real objects, planning pictures, and skills in using drawing equipment using learning forms in the form of lectures, practice, planning and using various learning methods in the form of group discussions, case studies, and project-based learning. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| References | Main : | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <ol style="list-style-type: none"> Anwari, 1978. Menggambar Teknik Mesin 2 . Jakarta: Departemen Pendidikan dan kebudayaan Baharudin Yakob. 1979. Menggambar Mesin 3 . Jakarta: Departemen Pendidikan dan Kebudayaan Juhana Ohan, Suratman. M. 2000. Menggambar Teknik Mesin . Bandung: Pustaka Grafika Marbun, Moyn. 1993. Menggambar Teknik Mesin . Bandung: Penerbit M2S Sato Takhesi, Sugiarto. 1986. Menggambar Mesin. Jakarta: Pradnya Paramita Yogaswara, Eka. 2004. Membaca Gambar Teknik SMK. Bandung: Armico | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Supporters: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <ol style="list-style-type: none"> www.teachertube.com/video/orthographic-projection-252358 https://www.youtube.com/watch?v=h1jRXwISQXs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Supporting lecturer | Agung Pijo Budijono, S.T., M.T. Akhmad Hafizh Ainur Rasyid, S.T., M.T. Diastian Vinaya Wijanarko, S.T., M.T. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Week- | Final abilities of each learning | Evaluation | Help Learning, Learning methods, Student Assignments, [Estimated time] | Learning materials [References] | Assessment Weight (%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | stage (Sub-PO) | Indicator | Criteria & Form | Offline (offline) | Online (online) | | |
|-----|---|--|--|--|--|--|-----|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| 1 | Able to explain the function of technical drawings | Accuracy in explaining the function of technical drawings | Criteria: conformity with the observation rubric Form of Assessment : Participatory Activities | Lectures, discussions, questions and answers 2 X 50 | Lectures, discussions, questions and answers 2 X 50 | Material: image function Bibliography: Sato Takhesi, Sugiarto. 1986. <i>Drawing Machines</i> . Jakarta: Pradnya Paramita | 3% |
| 2 | Able to mention various technical drawing tools, geometric constructions, and letters | 1.Accuracy in identifying at least 4 main drawing tools 2.Accuracy of identifying geometric constructions 3.Accuracy of identifying letters according to ISO standards | Criteria: conformity with the answer key Form of Assessment : Participatory Activities | Lectures, discussions, questions and answers, exercises and assignments 2 X 50 | Lectures, discussions, questions and answers, exercises and assignments 2 X 50 | Material: drawing equipment References: Sato Takhesi, Sugiarto. 1986. <i>Drawing Machines</i> . Jakarta: Pradnya Paramita | 3% |
| 3 | Able to create geometry | Accuracy in creating geometric images | Criteria: conformity with the assessment rubric Form of Assessment : Project Results Assessment / Product Assessment | Lectures, discussions, questions and answers, exercises and assignments 2 X 50 | Lectures, discussions, questions and answers, exercises and assignments 2 X 50 | Material: geometric drawing Reader: Sato Takhesi, Sugiarto. 1986. <i>Drawing Machines</i> . Jakarta: Pradnya Paramita | 4% |
| 4 | Able to explain the various lines and their uses in technical drawings | 1.Accuracy in explaining various lines 2.Accuracy of applying lines to images according to ISO standards | Criteria: conformity with the observation rubric Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment | Lectures, discussions, questions and answers, exercises and assignments 2 X 50 | Lectures, discussions, questions and answers, exercises and assignments 2 X 50 | Material: line Bibliography: Sato Takhesi, Sugiarto. 1986. <i>Drawing Machines</i> . Jakarta: Pradnya Paramita | 8% |
| 5 | Be able to explain the rules of pictorial projection | Accurate understanding of pictorial projection rules | Criteria: conformity with the answer key Form of Assessment : Participatory Activities | Lectures, discussions, questions and answers, exercises and assignments 2 X 50 | Lectures, discussions, questions and answers, exercises and assignments 2 X 50 | Material: projection Bibliography: Sato Takhesi, Sugiarto. 1986. <i>Drawing Machines</i> . Jakarta: Pradnya Paramita | 3% |
| 6 | Able to create images of objects using pictorial projection rules | 1.Accuracy of creating images using isometry projection rules 2.Accuracy of creating images using dimetric projection rules | Criteria: conformity with the assessment rubric Form of Assessment : Project Results Assessment / Product Assessment | Lectures, discussions, questions and answers, exercises and assignments 2 X 50 | Lectures, discussions, questions and answers, exercises and assignments 2 X 50 | Material: projection Bibliography: Sato Takhesi, Sugiarto. 1986. <i>Drawing Machines</i> . Jakarta: Pradnya Paramita Material: projection Library: https://www.youtube.com/... | 8% |
| 7 | Be able to explain the rules of orthogonal projection | 1.The accuracy of understanding the American orthogonal projection rule 2.The accuracy of understanding the European orthogonal projection rules | Criteria: conformity with the observation rubric Form of Assessment : Participatory Activities | Lectures, discussions, questions and answers, practice 2 X 50 | Lectures, discussions, questions and answers, practice 2 X 50 | Material: projection Bibliography: Sato Takhesi, Sugiarto. 1986. <i>Drawing Machines</i> . Jakarta: Pradnya Paramita Material: projection Library: https://www.youtube.com/... | 3% |
| 8 | sub summative exam | able to solve USS questions | Criteria: Complete USS questions according to the assessment rubric | solve the USS 2 X 50 problem | solve the USS 2 X 50 problem | Material: all material Reader: Sato Takhesi, Sugiarto. 1986. <i>Drawing Machines</i> . Jakarta: Pradnya Paramita | 5% |

| | | | | | | | |
|----|--|--|---|---|---|---|-----|
| 9 | Able to create images of objects using American orthogonal projection rules | Accuracy of creating images using American projection rules | Criteria: conformity with the assessment rubric Form of Assessment : Project Results Assessment / Product Assessment | Lectures, discussions, questions and answers, exercises and assignments 2 X 50 | Lectures, discussions, questions and answers, exercises and assignments 2 X 50 | Material: projection Library: https://www.youtube.com/... Material: projection Bibliography: Sato Takhesi, Sugiarto. 1986. <i>Drawing Machines</i> . Jakarta: Pradnya Paramita | 8% |
| 10 | Able to create images of objects using European orthogonal projection rules | Accuracy of creating images using European projection rules | Criteria: conformity with the assessment rubric Form of Assessment : Project Results Assessment / Product Assessment | Lectures, discussions, questions and answers, exercises and assignments 2 X 50 | Lectures, discussions, questions and answers, exercises and assignments 2 X 50 | Material: projection Bibliography: Sato Takhesi, Sugiarto. 1986. <i>Drawing Machines</i> . Jakarta: Pradnya Paramita Material: projection Library: https://www.youtube.com/... | 8% |
| 11 | Able to explain the rules of cut drawings | Accurate understanding of the rules for creating cut drawings | Criteria: conformity with the answer key Form of Assessment : Participatory Activities | Lectures, discussions, questions and answers, practice 2 X 50 | Lectures, discussions, questions and answers, practice 2 X 50 | Material: pieces Bibliography: Sato Takhesi, Sugiarto. 1986. <i>Drawing Machines</i> . Jakarta: Pradnya Paramita | 4% |
| 12 | Able to create projection images equipped with cuts | Accuracy of creating images with cuts | Criteria: conformity with the assessment rubric Form of Assessment : Project Results Assessment / Product Assessment | Lectures, discussions, questions and answers, exercises and assignments 2 X 50 | Lectures, discussions, questions and answers, exercises and assignments 2 X 50 | Material: pieces Bibliography: Sato Takhesi, Sugiarto. 1986. <i>Drawing Machines</i> . Jakarta: Pradnya Paramita | 10% |
| 13 | Able to create 3D to 2D images using projection rules and equipped with cuts | The accuracy of creating 3D images into 2D using projection rules and equipped with cuts | Criteria: conformity with the assessment rubric Form of Assessment : Project Results Assessment / Product Assessment | Lectures, discussions, questions and answers, exercises and assignments 2 X 50 | Lectures, discussions, questions and answers, exercises and assignments 2 X 50 | Material: projection Bibliography: Sato Takhesi, Sugiarto. 1986. <i>Drawing Machines</i> . Jakarta: Pradnya Paramita Material: projection Library: https://www.youtube.com/... Material: pieces Bibliography: Sato Takhesi, Sugiarto. 1986. <i>Drawing Machines</i> . Jakarta: Pradnya Paramita | 10% |
| 14 | Able to create 2D to 3D images using projection rules and equipped with cuts | The accuracy of creating 2D to 3D images using projection rules and equipped with cuts | Criteria: suitability of answers to the key Form of Assessment : Project Results Assessment / Product Assessment | Lectures, discussions, questions and answers, exercises and assignments 2 X 50 | Lectures, discussions, questions and answers, exercises and assignments 2 X 50 | Material: projection Library: https://www.youtube.com/... Material: pieces Bibliography: Sato Takhesi, Sugiarto. 1986. <i>Drawing Machines</i> . Jakarta: Pradnya Paramita | 10% |
| 15 | Able to evaluate the use of projections and cuts in images | Accuracy of evaluating images | Criteria: suitability of answers to the key | Lectures, discussions, questions and answers, practice 2 X 50 | Lectures, discussions, questions and answers, practice 2 X 50 | Material: projection Library: https://www.youtube.com/... Material: pieces Bibliography: Sato Takhesi, Sugiarto. 1986. <i>Drawing Machines</i> . Jakarta: Pradnya Paramita | 8% |
| 16 | summative exam | able to solve our problems | Criteria: Complete the questions according to the assessment rubric | do the US 2 X 50 problem | do the US 2 X 50 problem | Material: all material Reader: Sato Takhesi, Sugiarto. 1986. <i>Drawing Machines</i> . Jakarta: Pradnya Paramita | 5% |

Evaluation Percentage Recap: Project Based Learning

| No | Evaluation | Percentage |
|----|---|------------|
| 1. | Participatory Activities | 20% |
| 2. | Project Results Assessment / Product Assessment | 62% |
| | | 82% |

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.