



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

Document Code

SEMESTER LEARNING PLAN

| Courses | CODE | Course Family | Credit Weight | | | SEMESTER | Compilation Date |
|----------------------|--|-----------------------------------|-----------------------------------|-----|--------|----------------------------------|------------------|
| Drawing techniques | 2020102324 | Compulsory Study Program Subjects | T=0 | P=0 | ECTS=0 | 3 | July 17, 2024 |
| AUTHORIZATION | SP Developer | | Course Cluster Coordinator | | | Study Program Coordinator | |
| | Dr. Edy Sulistiyo, M.Pd. ; Yuli Sutoto Nugroho, S.Pd., M.Pd. ; Fendi Achmad, S.Pd., M.Pd.; Sayyidul Aulia Alamsyah, S.T., M.T. | | Prof. Dr. Bambang Suprianto, M.T. | | | Dr. Lusia Rakhmawati, S.T., M.T. | |

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| Learning model | Project Based Learning |
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| Program Learning Outcomes (PLO) | PLO study program which is charged to the course |
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| PLO-6 | Able to design system components and/or processes to be applied in the field of electrical engineering |
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| Program Objectives (PO) | |
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| PO - 1 | Able to design PCB and print it |
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| PO - 2 | Able to use Proteus as a circuit simulation medium |
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| PO - 3 | Able to plan schematic electronic circuits using Easyeda |
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| PO - 4 | Able to work in a team to design electronic circuits |
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| PO - 5 | Students can explain the function and properties of images as technical language |
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| PO - 6 | Students can draw the basics of technical drawings |
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| PO - 7 | Students can draw basic electricity and electronics drawings |
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| PO - 8 | Students can draw electrical installations |
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| PO - 9 | Students can draw with the AutoCAD application program |
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| PLO-PO Matrix | |
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| | <table border="1"> <tr> <td>P.O</td> <td>PLO-6</td> </tr> <tr> <td>PO-1</td> <td></td> </tr> <tr> <td>PO-2</td> <td></td> </tr> <tr> <td>PO-3</td> <td></td> </tr> <tr> <td>PO-4</td> <td></td> </tr> <tr> <td>PO-5</td> <td></td> </tr> <tr> <td>PO-6</td> <td></td> </tr> <tr> <td>PO-7</td> <td></td> </tr> <tr> <td>PO-8</td> <td></td> </tr> <tr> <td>PO-9</td> <td></td> </tr> </table> | P.O | PLO-6 | PO-1 | | PO-2 | | PO-3 | | PO-4 | | PO-5 | | PO-6 | | PO-7 | | PO-8 | | PO-9 | |
| P.O | PLO-6 | | | | | | | | | | | | | | | | | | | | |
| PO-1 | | | | | | | | | | | | | | | | | | | | | |
| PO-2 | | | | | | | | | | | | | | | | | | | | | |
| PO-3 | | | | | | | | | | | | | | | | | | | | | |
| PO-4 | | | | | | | | | | | | | | | | | | | | | |
| PO-5 | | | | | | | | | | | | | | | | | | | | | |
| PO-6 | | | | | | | | | | | | | | | | | | | | | |
| PO-7 | | | | | | | | | | | | | | | | | | | | | |
| PO-8 | | | | | | | | | | | | | | | | | | | | | |
| PO-9 | | | | | | | | | | | | | | | | | | | | | |

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| PO Matrix at the end of each learning stage (Sub-PO) | |
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| | | <table border="1"> <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> <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> <tr><td>PO-4</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-5</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-6</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-7</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-8</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-9</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 | | | | | | | | | | | | | | | | | PO-4 | | | | | | | | | | | | | | | | | PO-5 | | | | | | | | | | | | | | | | | PO-6 | | | | | | | | | | | | | | | | | PO-7 | | | | | | | | | | | | | | | | | PO-8 | | | | | | | | | | | | | | | | | PO-9 | | | | | | | | | | | | | | | | |
|------|--|--|------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|-----|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | | 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | PO-4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | PO-5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | PO-6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | PO-7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PO-8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PO-9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Short Course Description Students can discuss the function and nature of drawings as a technical language, drawing tools, lines and letters, providing measurements, electrical symbols, drawing charts and have the ability to draw, analyze and implement electronic circuits into layout drawings on PCBs with the help of drawing tools or electronics software uses project based learning in lectures.

References

Main :

1. Moyn Marbun. 1992. Menggambar Teknik Mesin. Bandung: M2S.
2. Edy Setiawan. 1986. Instalasi Listrik Arus Kuat I. Jakarta: Bina Cipta.
3. Supari Muslim, dan Joko (2009). Perencanaan dan Pemasangan Instalasi Listrik. Jakarta: Dit PSMK.

Supporters:

1. Edy Setiawan. 1986. Instalasi Listrik Arus Kuat I. Jakarta: Bina Cipta.

Supporting lecturer Fendi Achmad, S.Pd., M.Pd.
Sayyidul Aulia Alamsyah, S.T., 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 | Students can explain the function and properties of images as technical language | 1.Students are able to carry out technical drawing steps correctly according to procedures 2.Able to use technical drawing equipment correctly according to the function of the equipment | Criteria: Students' activities and responses during learning activities, especially practicums, are assessed as participation Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment | Presentation, discussion, demonstration and practice 2 x 50 | | Material: Meeting material 1 Reader: Moyn Marbun. 1992. Mechanical Engineering Drawing. Bandung: M2S. Supari Muslim, and Joko (2009). Planning and Installation of Electrical Installations. Jakarta: Directorate of PSMK. | 3% |
| 2 | Students can draw the basics of technical drawings | □ Students can draw the basics of technical drawings according to the examples given | Criteria: Students' activities and responses during learning activities, especially practicums, are assessed as participation Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment | Presentation, discussion, demonstration and practice 2 x 50 | | Material: Material from the meeting of two readers: Supari Muslim, and Joko (2009). Planning and Installation of Electrical Installations. Jakarta: Directorate of PSMK. | 4% |

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| 3 | Students can draw basic electricity and electronics drawings | 1.Students can draw basic electricity drawings according to standard symbols 2.Students can draw electrical symbols according to the guidelines | Criteria: Students' activities and responses during learning activities, especially practicums, are assessed as participation Form of Assessment : Participatory Activities | Presentation, discussion, demonstration and practice 2 x 50 | | Material: Electrical and building engineering symbols Reference: <i>Supari Muslim, and Joko (2009). Planning and Installation of Electrical Installations. Jakarta: Directorate of PSMK.</i> | 4% |
| 4 | Students can draw basic electricity and electronics drawings | 1.Students can draw basic electronics using standard symbols 2.Students can draw electronic symbols according to the guidelines | Criteria: Students' activities and responses during learning activities, especially practicums, are assessed as participation Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment | Presentation, discussion, demonstration and practice 2 x 50 | | Material: Electronic engineering symbols, implementation of symbols in a series. Reference: <i>Supari Muslim, and Joko (2009). Planning and Installation of Electrical Installations. Jakarta: Directorate of PSMK.</i> | 2% |
| 5 | Students can draw electrical installations | Students can draw lighting installations 1 and phase 1 group in accordance with standards applicable in Indonesia | Criteria: Students' activities and responses during learning activities, especially practicums, are assessed as participation Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment | Presentation, discussion, demonstration and practice 2 x 50 | | Material: Image of lighting installation for 1 phase 1 group Reader: <i>Supari Muslim, and Joko (2009). Planning and Installation of Electrical Installations. Jakarta: Directorate of PSMK.</i> | 5% |
| 6 | Students can draw electrical installations | Students can draw 1 phase 2 and 3 group lighting installations in accordance with applicable standards in Indonesia | Criteria: Students' activities and responses during learning activities, especially practicums, are assessed as participation Form of Assessment : Participatory Activities | Presentation, discussion, demonstration and practice 2 x 50 | | Material: Pictures of lighting installations for 1 phase 2 and 3 groups. Reference: <i>Supari Muslim, and Joko (2009). Planning and Installation of Electrical Installations. Jakarta: Directorate of PSMK.</i> | 5% |
| 7 | Students can draw with the AutoCAD application program | Students can use the AutoCAD program to draw according to the images provided | Criteria: Students' activities and responses during learning activities, especially practicums, are assessed as participation Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment | Presentation, discussion, demonstration and practice 2 x 50 | | Material: Image of 3-phase lighting installation Reference: <i>Supari Muslim, and Joko (2009). Planning and Installation of Electrical Installations. Jakarta: Directorate of PSMK.</i> | 3% |

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| 8 | UTS | <p>1. Students can use the menus and tools contained in the AutoCAD program appropriately according to their function</p> <p>2. Students can use the AutoCAD program to draw according to the images provided</p> | <p>Criteria: Students' activities and responses during learning activities, especially practicums, are assessed as participation</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p> | <p>Presentation, discussion, demonstration and practice 2 x 50</p> | | | 20% |
| 9 | Able to use Proteus as a circuit simulation medium | Able to practice creating circuit simulations in Proteus | <p>Criteria: Students' activities and responses during learning activities, especially practicums, are assessed as participation</p> <p>Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment</p> | <p>Presentation, discussion, demonstration and practice 2 x 50</p> | | | 3% |
| 10 | <p>1. Able to use Proteus as a circuit simulation medium</p> <p>2. Able to work in a team to design electronic circuits</p> | Students can create appropriate electronic circuits that run on Proteus | <p>Criteria: Students' activities and responses during learning activities, especially practicums, are assessed as participation</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p> | <p>Presentation, discussion and practice 2 x 50</p> | | | 3% |
| 11 | Able to plan schematic electronic circuits using Easyeda | Able to use the tools on the Easyeda schematic page to create circuits | <p>Criteria: Students' activities and responses during learning activities, especially practicums, are assessed as participation</p> <p>Form of Assessment : Participatory Activities, Practice/Performance</p> | <p>Presentation, discussion, demonstration and practice 2 x 50</p> | | | 3% |
| 12 | <p>1. Able to plan schematic electronic circuits using Easyeda</p> <p>2. Able to work in a team to design electronic circuits</p> | <p>1. Able to draw electronic circuits on the Easyeda schematic page</p> <p>2. Able to work together in drawing electronic circuits on the Easyeda schematic page</p> | <p>Criteria: Students' activities and responses during learning activities, especially practicums, are assessed as participation</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p> | <p>Presentation, discussion and practice 2 x 50</p> | | | 3% |
| 13 | Able to design PCB and print it | Able to design a PCB on the easyeda PCB design page | <p>Criteria: Students' activities and responses during learning activities, especially practicums, are assessed as participation</p> <p>Form of Assessment : Participatory Activities, Practice/Performance</p> | <p>Presentation, discussion, demonstration and practice 2 x 50</p> | | | 3% |

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| 14 | 1.Able to design PCB and print it 2.Able to work in a team to design electronic circuits | 1.Able to design a PCB on the easyeda PCB design page 2.Able to collaborate in designing PCBs | Criteria: Students' activities and responses during learning activities, especially practicums, are assessed as participation Form of Assessment : Project Results Assessment / Product Assessment | Presentation, discussion and practice 2 x 50 | | | 4% |
| 15 | 1.Able to use Proteus as a circuit simulation medium 2.Able to plan schematic electronic circuits using Easyeda 3.Able to design PCB and print it | 1.Able to explain the reasons for PCB design 2.Able to explain the reasons for schematic design | Criteria: Reports, Presentations and Products Form of Assessment : Project Results Assessment / Product Assessment | Presentation, discussion and practice 2 x 50 | | | 5% |
| 16 | UAS | 1.Able to explain the reasons for PCB design 2.Able to explain the reasons for schematic design 3.Able to design PCB and print it 4.Able to plan schematic electronic circuits using Easyeda 5.Able to use Proteus as a circuit simulation medium | Criteria: Reports, Presentations and Products Form of Assessment : Project Results Assessment / Product Assessment | Presentation, discussion and practice 2 x 50 | | | 30% |

Evaluation Percentage Recap: Project Based Learning

| No | Evaluation | Percentage |
|----|---|------------|
| 1. | Participatory Activities | 22% |
| 2. | Project Results Assessment / Product Assessment | 75% |
| 3. | Practice / Performance | 3% |
| | | 100% |

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** abilities in the process and student learning outcomes are specific and measurable statements that identify the abilities 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.

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.