| | Universitas Negeri Surabaya<br>Faculty of Engineering<br>Civil Engineering Undergraduate Study Program | Document Code |
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# SEMESTER LEARNING PLAN

| Courses | CODE | Course Family | Credit Weight | | | SEMESTER | Compilation Date |
|---|---|---|---|---|---|---|---|
| ROAD AND CONCRETE MATERIALS TECHNOLOGY | 2220102181 | Compulsory Study Program Subjects | T=2 | P=0 | ECTS=3.18 | 1 | July 11, 2023 |

| AUTHORIZATION | SP Developer | Course Cluster Coordinator | Study Program Coordinator |
|---|---|---|---|
| | Ir. Arie Wardhono, S.T., M.MT., M.T., Ph.D. | Ir. Arie Wardhono, S.T., M.MT., M.T., Ph.D. | Yogie Risdianto, S.T., M.T. |

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| **Learning model** | **Case Studies** |
| **Program Learning Outcomes (PLO)** | **PLO study program that is charged to the course** |
| | **Program Objectives (PO)** |
| | **PLO-PO Matrix** |

| | P.O |
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**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 |

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| **Short Course Description** | This course contains knowledge and testing of building construction materials in the form of red brick wall covering materials, tile roof covering materials, paving, mortar, stone, hydraulic binding materials, wood, metal, floor covering materials, exterior and interior wall materials, ceiling covering materials, roof covering materials, and additional materials (additives). Testing of paving stone, tile, wood, plywood and spec materials. The learning method used is a combination of direct and cooperative learning models. |
| **References** | **Main :** |


1. Jackson, N. 1978.Civil Engineering Materials. Hongkong: ELB&Macmillan.
2. Puslitbang Pemukiman. 1982.Persyaratan Umum Bahan Bangunan di Indonesia. Bandung: Balitbang. PU.
3. Singh, G. 1979.Materials of Construction. Delhi: Standard Book Serveice.
4. Ringsun, I Nyoman. 2004.Buku Ajar Ilmu Bahan. Surabaya: Unesa University Press.
5. Brosur-brosur produk bahan bangunan.


**Supporters:**

1. Peran Water Binder Ratio Terhadap Kekuatan Mortar Geopolimer Berbahan Dasar Limbah Abu Terbang Kelas C dan Aktivator Kering (Wet Method) NaOH 12 Molar

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| **Supporting lecturer** | Muhammad Imaduddin, S.T., M.T.<br>Arie Wardhono, S.T., M.MT., M.T., Ph.D.<br>Meity Wulandari, 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) |

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| **1** | 1. Students are able to explain the origin and types of natural stone<br>2. Practical: Introduction to materials | 1. Explain the circulation of natural stones<br>2. Explain the types of natural stone<br>3. Explain the arrangement of stone grains<br>4. Explain the types of building materials | **Criteria:**<br>Full marks are obtained if you do all the questions correctly, writing, correct analysis of practical results, completeness of the report<br><br>**Form of Assessment** :<br>Participatory Activities | Lectures, discussions and questions and answers<br>3 X 50 | | **Material:**<br>Introduction to library materials<br>**:** *Research and Development Center for Settlements. 1982. General Requirements for Building Materials in Indonesia. Bandung: Balitbang. PU.* | 3% |
| **2** | 1. Students are able to explain the manufacturing process, requirements, and testing methods for bricks and bricks<br>2. Practicum: Introduction to building material testing methods | 1. Explains the manufacturing process, requirements, and brick testing methods<br>2. Explains the manufacturing process, requirements, and brick testing methods<br>3. Explain the methods of testing building materials | **Criteria:**<br>Full marks are obtained if you do all the questions correctly, writing, correct analysis of practical results, completeness of the report<br><br>**Form of Assessment** :<br>Participatory Activities | Lectures, discussions and questions and answers<br>3 X 50 | | **Material:**<br>Introduction to building materials testing methods<br>**References:**<br>*Singh, G. 1979.Materials of Construction. Delhi: Standard Book Service.* | 4% |
| **3** | Students are able to explain the manufacturing process, requirements, and testing methods for bricks and bricks<br>Practicum: Introduction to building materials testing methods | 1. Explains the manufacturing process, requirements, and brick testing methods<br>2. Explains the manufacturing process, requirements, and brick testing methods<br>3. Explain the methods of testing building materials | **Criteria:**<br>Full marks are obtained if you do all the questions correctly, writing, correct analysis of practical results, completeness of the report<br><br>**Form of Assessment** :<br>Participatory Activities | Lectures, discussions and questions and answers<br>3 X 50 | | **Material:**<br>Manufacturing process, requirements, and testing methods for bricks and concrete blocks<br>Practical: Introduction to testing methods for building materials<br>**References:**<br>*Ringsun, I Nyoman. 2004. Textbook of Materials Science. Surabaya: Unesa University Press.* | 4% |

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| **4** | 1. Students are able to explain the types, properties, classes, defects and testing methods of wood as a building material<br>2. Students are able to explain plywood as a building material. Practicum: Wood and plywood | 1. Explains the types, properties, classes, defects, and testing methods of wood as a building material<br>2. Explain plywood as a building material<br>3. Carrying out practical work on wood and plywood materials | **Criteria:**<br>Full marks are obtained if you do all the questions correctly, writing, correct analysis of practical results, completeness of the report<br><br>**Form of Assessment** : Participatory Activities | Lectures, discussions and questions and answers, 3 X 50 practicum | | **Material:** Types, properties, classes, defects, and testing methods for wood as a building material. **Reference:** *Jackson, N. 1978. Civil Engineering Materials. Hong Kong: ELB&Macmillan.*<br><br>**Material:** Plywood as a building material Practicum: Wood and plywood materials **Literature:** *Center for Research and Development on Settlements. 1982. General Requirements for Building Materials in Indonesia. Bandung: Balitbang. PU.* | 4% |
| **5** | 1. Students are able to explain the types, properties, classes, defects and testing methods of wood as a building material<br>2. Students are able to explain plywood as a building material | 1. Explains the types, properties, classes, defects, and testing methods of wood as a building material<br>2. Explain plywood as a building material<br>3. Carrying out practical work on wood and plywood materials | **Criteria:**<br>Full marks are obtained if you do all the questions correctly, writing, correct analysis of practical results, completeness of the report<br><br>**Form of Assessment** : Participatory Activities | Lectures, discussions and questions and answers, 3 X 50 practicum | | **Material:** types, properties, classes, defects, and testing methods for wood as a building material. **Reference:** *Jackson, N. 1978. Civil Engineering Materials. Hong Kong: ELB&Macmillan.*<br><br>**Material:** Plywood as a building material **Reference:** *Research and Development Center for Settlements. 1982. General Requirements for Building Materials in Indonesia. Bandung: Balitbang. PU.* | 4% |

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| **6** | 1. Students can explain the various types of flooring materials<br>2. Students can explain various types of wall materials (Practicum: Paving block materials) | 1. Explain the various types of flooring materials<br>2. Explain the various types of wall materials<br>3. Carrying out practical work on paving block materials | **Criteria:**<br>Full marks are obtained if you do all the questions correctly, writing, correct analysis of practical results, completeness of the report<br><br>**Form of Assessment** :<br>Participatory Activities | Lectures, discussions and questions and answers, 3 X 50 practicum | | **Material:**<br>Various flooring materials<br>**Reference:**<br>*Center for Research and Development for Settlements. 1982. General Requirements for Building Materials in Indonesia. Bandung: Balitbang. PU.*<br><br>**Material:**<br>Various wall materials<br>**Reference:**<br>*Jackson, N. 1978. Civil Engineering Materials. Hong Kong: ELB&Macmillan.* | 3% |
| **7** | 1. Students can explain the various types of flooring materials<br>2. Students can explain various types of wall materials (Practicum: Paving block materials) | 1. Explain the various types of flooring materials<br>2. Explain the various types of wall materials<br>3. Carrying out practical work on paving block materials | **Criteria:**<br>Full marks are obtained if you do all the questions correctly, writing, correct analysis of practical results, completeness of the report<br><br>**Form of Assessment** :<br>Participatory Activities | Lectures, discussions and questions and answers, 3 X 50 practicum | | **Material:**<br>Various flooring materials<br>**Reference:**<br>*Center for Research and Development for Settlements. 1982. General Requirements for Building Materials in Indonesia. Bandung: Balitbang. PU.*<br><br>**Material:**<br>Various wall materials<br>**Reference:**<br>*Jackson, N. 1978. Civil Engineering Materials. Hong Kong: ELB&Macmillan.* | 3% |
| **8** | 1. Students can explain the various types of ceiling covering materials<br>2. Students can explain the various types of roof covering materials<br>3. Practical: Tile materials | 1. Explains the types, how to make, technical specifications, advantages, disadvantages, and how to install ceiling covering materials<br>2. Explains the types, how to make, technical specifications, advantages, disadvantages, and how to install roof covering materials<br>3. Carrying out practical work on roof tile materials | **Criteria:**<br>Full marks are obtained if you do all the questions correctly, writing, correct analysis of practical results, completeness of the report<br><br>**Form of Assessment** :<br>Test | Lectures, discussions and questions and answers, 3 X 50 practicum | | | 20% |

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| **9** | 1. Students can explain the various types of ceiling covering materials<br>2. Students can explain the various types of roof covering materials<br>3. Practical: Tile materials | 1. Explains the types, how to make, technical specifications, advantages, disadvantages, and how to install ceiling covering materials<br>2. Explains the types, how to make, technical specifications, advantages, disadvantages, and how to install roof covering materials<br>3. Carrying out practical work on roof tile materials | **Criteria:**<br>Full marks are obtained if you do all the questions correctly, writing, correct analysis of practical results, completeness of the report<br><br>**Form of Assessment** : Participatory Activities | Lectures, discussions and questions and answers, 3 X 50 practicum | | **Material:** Various ceiling covering materials<br>**Reference:** *Ringsun, I Nyoman. 2004. Textbook of Materials Science. Surabaya: Unesa University Press.*<br><br>**Material:** Various roof covering materials<br>**Reference:** *Research and Development Center for Settlements. 1982. General Requirements for Building Materials in Indonesia. Bandung: Balitbang. PU.* | 4% |
| **10** | Sub Summative Exam | | **Criteria:**<br>Full marks are obtained if you do all the questions correctly<br><br>**Form of Assessment** : Participatory Activities, Tests | Written test 2 X 50 | | | 3% |
| **11** | Students are able to explain the types of hydraulic bonding materials (Practicum: Specific materials) | 1. Explain the types of chalk materials<br>2. Explain the types of red cement material<br>3. Explain the types of plaster and plaster materials<br>4. Explain the types of posolan materials<br>5. Explain the types of Portland cement and white cement<br>6. Explain the types of mortar<br>7. Carrying out special material practicums | **Criteria:**<br>Full marks are obtained if you do all the questions correctly, writing, correct analysis of practical results, completeness of the report<br><br>**Form of Assessment** : Participatory Activities | Lectures, discussions and questions and answers, 3 X 50 practicum | | **Material:** Types of hydraulic binding materials<br>**Reference:** *Center for Research and Development for Settlements. 1982. General Requirements for Building Materials in Indonesia. Bandung: Balitbang. PU.* | 3% |
| **12** | Students are able to explain various types of metals as building materials (Practicum: Specific materials) | 1. Explain steel as a building material<br>2. Explain aluminum as a building material<br>3. Explain zinc as a building material<br>4. Carrying out special material practicums | **Criteria:**<br>Full marks are obtained if you do all the questions correctly, writing, correct analysis of practical results, completeness of the report<br><br>**Form of Assessment** : Participatory Activities | Lectures, discussions and questions and answers, 3 X 50 practicum | | **Material:** Various metals as building materials<br>**Library:** *Center for Research and Development for Settlements. 1982. General Requirements for Building Materials in Indonesia. Bandung: Balitbang. PU.* | 3% |

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| **13** | Students are able to carry out presentations on the latest building materials technology in groups (Practicum: Brick materials) | 1. Carrying out presentations on the latest building materials technology as a group<br>2. Carry out practical work on brick materials | **Criteria:**<br>Writing procedures, completeness and quality of reports, presentation of material, group collaboration during presentations<br>Writing procedures, correctness of analysis of practicum results, completeness of reports<br><br>**Form of Assessment** : Participatory Activities, Tests | Discussion and questions and answers, practicum 3 X 50 | | | 4% |
| **14** | Students are able to carry out presentations on the latest building materials technology in groups (Practicum: Brick materials) | 1. Carrying out presentations on the latest building materials technology as a group<br>2. Carry out practical work on brick materials | **Criteria:**<br>Writing procedures, completeness and quality of reports, presentation of material, group collaboration during presentations<br>Writing procedures, correctness of analysis of practicum results, completeness of reports<br><br>**Form of Assessment** : Participatory Activities | Discussion and questions and answers, practicum 3 X 50 | | **Material:** Bricks<br>**Library:** *Center for Research and Development on Settlements. 1982. General Requirements for Building Materials in Indonesia. Bandung: Balitbang. PU.* | 3% |
| **15** | Students are able to carry out presentations on the latest building materials technology in groups (Practicum: Brick materials) | 1. Carrying out presentations on the latest building materials technology as a group<br>2. Carry out practical work on brick materials | **Criteria:**<br>Writing procedures, completeness and quality of reports, presentation of material, group collaboration during presentations<br>Writing procedures, correctness of analysis of practicum results, completeness of reports<br><br>**Form of Assessment** : Participatory Activities | Discussion and questions and answers, practicum 3 X 50 | | **Material:** Bricks<br>**Library:** *Center for Research and Development on Settlements. 1982. General Requirements for Building Materials in Indonesia. Bandung: Balitbang. PU.*<br><br>**Material:** Environmentally Friendly Concrete Technology<br>**Reference:** *The Role of Water Binder Ratio on the Strength of Geopolymer Mortar Made from Class C Fly Ash Waste and Dry Activator (Wet Method) NaOH 12 Molar* | 5% |
| **16** | | | **Form of Assessment** : Participatory Activities, Tests | | | | 30% |

**Evaluation Percentage Recap: Case Study**

| No | Evaluation | Percentage |
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| 1. | Participatory Activities | 61.5% |
| 2. | Test | 38.5% |
| | | 100% |

**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** 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.
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.