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|  | **UNIVERSITAS NEGERI PADANG****FAKULTAS TEKNIK****JURUSAN TEKNIK ELEKTRONIKA** | **Document Code** |
| **SEMESTER LEARNING PLAN** |
| **COURSES** | **CODE** | **FIELD STUDY** | **CREDITS** | **SEMESTER** | **Compilation Date** |
| **DISCRETE MATHEMATICS** | TIK1.61.2304 | Compulsory Course Of Study Program | 3 Credits (theory) | 2 | July 2017 |
| **Authorization** | **Lecturer in Developing Semester Learning Plans** | **Course Cluster Coordinator** | **Head of The Study Program** |
|    **Delsina Faiza, S.T., M.T.****Nip. 19830413 200912 2 002** | **Drs. Putra Jaya, M.T.****Nip. 19621020 198602 1 001** | **Ahmaddul Hadi, S.Pd., M.Kom.****Nip. 197612092005011003** |
| **Learning Outcomes (CP)** | **CPL-PRODI**  |  |
| CP – S1 | Worship the One True God and be able to show religious attitudes |
| CP – PP6 | Understanding basic concepts of mathematics, electrical sciences, and electronics in the field of computers |
| CP – KU5 | be able to make informed decisions in the context of problem-solving in their areas of expertise, based on the results of information and data analysis. |
| CP – KK6  | Ability to master basic mathematics, electrical science, and electronics concepts for the development of computer systems |
| **CPMK function** |   |
| CPMK1 | Understanding set concepts |
| CPMK2 | Understand the concept of propositions to determine the compound propositions of some given propositions and be able to formulate them to draw logical conclusions |
| CPMK3 | Understanding the concept of relationships and functions, representation of relationships, properties of binary relationships, principles in relationship composition, determining the inverse of a function, and the composition of functions |
| CPMK4 | Understand the concept of addition and multiplication rules in combinatorial problems and perform calculations using permutations and combinations |
| CPMK5 | Understand the concept of boolean algebra and be able to formulate procedural problem solving related to the field of informatics engineering |
| CPMK6 | Understand the concept of graphs in general and be able to formulate procedural problem solving related to discrete objects in the field of informatics engineering |
| CPMK7 | Understand the definition and properties of trees, tree coloring, minimum stretching trees, rooted tree terminology, binary and traversal trees on trees, tree expressions, Huffman codes, and binary search trees |
| **Short Course Descriptions** | Discrete Mathematics is a branch of mathematics that examines discrete objects and structures. Considering the way computers work is discrete, the understanding and application of object characteristics and discrete structures in problems related to informatics knowledge are very important. Discrete Mathematics consists of several main materials namely Set, Mathematical Logic, Relation and Function, Combinatorial and Discrete Opportunities, Boolean Algebra, Graph, and Tree |
| **Study Materials (Learning materials)** | 1. Set2. Boolean Algebra3. Relationships4. Combinatorial5. Boolean Algebra6. Graf7. Tree |
| **References** | **Main:** |  |
| 1. Ir. Rinaldi Munir, M.T, (2003), Matematika Diskrit (edisi 6), Bandung : informatika
2. Jong Jek Siang (2014), Logika Matematika, Yogyakarta : Andi offset
3. Kenneth H. Rosen (2003), Discrete Mathematics and Application to Computer Science 5th edition, Mc Graw-Hill
 |
| **Supporting:** |   |
| 1. Robin J. Wilson (2010), Pengantar Teori Graf, Jakarta : Erlangga
2. Samuel Wibisono (2008), Matematika Diskrit (edisi 2), Yogyakarta : Graha Ilmu
3. Seymour Lipschutz, and Marc Tipson (2007), Matematika diskrit (edisi ketiga), Jakarta : Erlangga
4. ZK Abdurahman Baizal, M.Kom (2002) Diktat Matematika Diskrit, Jurusan Teknik Informatika STT Terlkom
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| **Learning Media** | **Software:** | **Hardware:** |
| MS Office 2019 | LCD & Projector |
| **Supporting lecturer** | Delsina Faza, S.T., M.T. |
| **Subject requirements** | - |
| **Weeks** |  **Sub-CPMK****(as the final expected ability)** | **Assessment Indicators** | **Criteria and Forms of Assessment** | **Forms, Learning Methods & Assignments** **[ Estimated time]** | **Learning materials****[Library / Learning Resources]** | **Rating Weight (%)** |
| **(1)** | **(2)** | **(3)** | **(4)** | **(5)** | **(6)** | **(7)** |
| 1-2 | Understand the theories, operations, and laws associated with the set. **[C4,A2][conceptual knowledge, Analyze]**  | 1. Accuracy of explaining the definition and how the set is presented2. Accuracy in explaining cardinality3. Accuracy in explaining and describing various sets4. Accuracy in explaining and describing operations on a set5. Accuracy of explaining and describing the laws of the association6. Accuracy in explaining the principles of inclusion and exclusion | **Criteria:**1. Quiz assessment2. Task assessment  | Lecture: Presentation**[TM: 2x(3x50")]**Mandiri**[BM: 2x(3x60")]****Task-1**:Solving the problem of the set**[BT: 2x(3x60")]** | 1. Set definiton2. Set presentation3. Cardinality4. Various sets5. Operation of the set6. Set laws7. Inclusion-exclusion principle**[1] p.: 47-70]****[2] p. 100%. 107-112]** | **15 %** |
| 3-4 | Understand the concept proposition to determine the compound proposition of some given proposition and be able to formulate it to draw logical conclusions **[C4, A2][conceptual knowledge, analyze]**  | 1. Accuracy explains the definition of propositions and compound propositions2. Accuracy of explaining tautology and contradictions3. Accuracy explains the properties and laws of mathematical logic4. Accuracy explains the inference and steps in concluding an argument5. Accuracy of explaining elemental reasoning and deduction | **Criteria:**1. Quiz assessment2. Task assessment | **Lecture**: Presentation**[TM: 2x(3x50")]**Mandiri**[BM: 2x(3x60")]****Task-2**Pcompletion of the question of mathematical logic**[BT: 2x(3x60")]** | 1. Proposition2. Compound proposition3. Tautology and contradictions4. Nature and Laws of the logic proposition5. Inference6. Elementer reasoning and deduction**[1] p. 100%. : 2 -35]****[2] p. 100%. : 1 -18]** | **15 %** |
| 5-6 | Understanding relations and functions, relationship representations, properties – properties of binary relationships, and principles in relationship composition. determining the inverse of a function and the composition of a function [C4, A2, A3][procedural knowledge, analyze]  | 1. Accuracy in representing inverse relationships and relationships2. Breadth and sharpness explain how to combine relationships3. Accuracy of explaining the composition and properties of relationships4. Accuracy determines equality and partial sorting relationships5. Accuracy in explaining relationship closure | **Criteria:**1. Quiz assessment2. Task assessment  | **Lecture**: Presentation**[TM: 2x(3x50")]**Mandiri**[BM: 2x(3x60")]****Task-3** Solving the problem of Relation**[BT: 2x(3x60")]**  | 1. Relationship representation2. Inverse relationships3. Combining relationships4. Relationship composition5. Traits of relationships6. Equality and partial sorting relationships7. Klosur relationships**[1] p. 100%. 103-124**  | **10 %** |
| 7-8 | Understand the concept of addition and multiplication rules in combinatorial problems and perform calculations using permutations and **combinations [C4, A2, A3][procedural knowledge, analyze]**  | 1. Accuracy in explaining the basic rules of calculating2. The breadth and sharpness of explaining the expansion of counting rules3. Accuracy explains the concept of permutations and combinations4. Breadth and sharpness in explaining permutations and combinations of common forms5. Accuracy in explaining combinations with repetition6. Breadth and sharpness in explaining Binomial coefficient7. Accuracy in explaining the principle of bird nests and discrete opportunities | **Criteria:**1. Quiz assessment2. Task assessment | **Lecture**: Presentation**[TM: 2x(3x50")]**Mandiri**[BM: 2x(3x60")]****Task-4** The completion of the question ofRelationship**[BT: 2x(3x60")]** | 1. Basic Rules of Calculating2. Expansion of Counting Rules3. Permutations4. Combination5. Permutations and Combinations of Common Forms6. Combination with Repetition7. Binomial Coefficient8. Bird's Nest Principle9. Discrete Opportunities**[1] p. 100%. : 225 -268]**  | **10 %** |
| **9** | **Midterm Examination: Formative evaluation intended to improve the learning process based on an assessment that has been done** |  |
| 10-11 | Understanding Boolean algebra and being able to formulate procedural problem solving related to the field of informatics engineering [C4, P3, A3][conceptual knowledge, Analyze]  | 1. Accuracy of explaining the boolean algebraic definition and a boolean expression2. Accuracy explains the principle of duality3. Breadth and sharpness in explaining boolean algebra laws4. Accuracy in explaining the function and complement of boolean function5. Breadth and sharpness in explaining canonical forms6. Accuracy of using boolean algebra in the calculation of informatics field | **Criteria:**1. Quiz assessment2. Task assessment  | **Lecture**: Presentation**[TM: 2x(3x50")]**Mandiri**[BM: 2x(3x60")]****Task-5**Solving the problem of boolean algebra**[BT: 2x(3x60")]** | 1. Defenisi boolean algebra2. Boolean expression3. Duality principle4. Boolean algebraic laws5. Boolean function6. Complement of boolean functions7. Canonical form8. Boolean algebra applicationSimplification of Boolean functions**[1] p. 100%. 281-233****[2] p. 100%. 19-25** | **15 %** |
| 12-13 | Understand the concept of graphs in general and be able to formulate procedural problem solving related to discrete objects in the field of informatics engineering a **[C4, A3]**  | 1. Accuracy of explaining graph definition and its properties2. Accuracy of explaining terminology and graph representation3. Accuracy of explaining isomorphic graphs4. The breadth of explaining the planar graph and graph field5. Accuracy of explaining track definition and Euler circuitry6. Accuracy explains hamilton's track and circuit defects7. Accuracy in using graph applications in the field of informatics | **Criteria:**1. Quiz assessment2. Task assessment   | **Lecture**: Presentation**[TM: 2x(3x50")]**Mandiri**[BM: 2x(3x60")]****Task-6**: Solve a problem with the concept of graphs**[BT: 2x(3x60")]**  | 1. Graph definiion2. Types of graphs3. Graph terminology4. Some special simple graphs5. Graph representation6. Isomorphic graph7. Graf planar and graph fields8. Track and Euler circuit9. Hamilton track and circuit10. Multiple graph applications**[2] p. 100%. 353-430**  | **20 %** |
| 14-15 | Understand and explain the definition and properties of trees, tree coloring, minimum stretch trees, rooted tree terminology, binary and traversal trees on trees, tree expressions, Huffman codes, and binary search trees **[C4, A3]**     | 1. Accuracy of explaining the definition and properties of trees2. Accuracy determines in a tree coloring3. Accuracy of explaining the stretched tree4. Accuracy of explaining rooted tree terminology5. Accuracy of explaining binary and traversal trees6. Accuracy in explaining tree expressions7. Accuracy determines the value of the Huffman code8. Accuracy in determining the value of Binary Search Tree | **Criteria:**1. Quiz assessment2. Task assessment  | **Lecture**: Presentation**[TM: 2x(3x50")]**Mandiri**[BM: 2x(3x60")]****Task-7**: Solvingthe problem of trees**[BT: 2x(3x60")]** | 1. Defenition and Tree Properties2. Tree coloring3. Tree Stretching minimum4. Rooted Tree Terminology5. Binary and Traversal Trees6. Tree of Expression7. Huffman Code8. Binary Search Tree**[1] p. 100%. 433-487**  | **15 %** |
| **16** | **Final Semester Examination: Evaluation intended to know the final achievements of student learning results** |  |
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**Note**:

1. Learning Achievement of Prodi Graduates (CPL-PRODI) is the ability possessed by each study program graduate which is the internalization of attitude, mastery of knowledge, and skills by the level of study program obtained through the learning process.

2. CPL charged to the course are some learning achievements of graduates of the study program (CPL-PRODI) which is used for the formation/development of a course consisting of aspects of attitude, general bluntness, special skills, and knowledge.

3. Cp Course (CPMK) is the ability described specifically from the CPL charged on the subject, and is specific to the study material or learning material of the subject.

4. Subject Sub-CP (Sub-CPMK) is a specifically described ability of CPMK that can be measured or observed and is the final ability planned at each stage of learning and is specific to the subject's learning material.

5. Assessment Criteria is a benchmark used as a measure or benchmark of learning attainability in assessment based on established indicators. Assessment criteria are a guideline for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.

6. Indicators of assessment of 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.