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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. Set  2. Boolean Algebra  3. Relationships  4. Combinatorial  5. Boolean Algebra  6. Graf  7. 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 | | | | | | | | | | | | |
| **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 presented  2. Accuracy in explaining cardinality  3. Accuracy in explaining and describing various sets  4. Accuracy in explaining and describing operations on a set  5. Accuracy of explaining and describing the laws of the association  6. Accuracy in explaining the principles of inclusion and exclusion | | | **Criteria:**  1. Quiz assessment  2. Task assessment | Lecture:  Presentation  **[TM: 2x(3x50")]**  Mandiri  **[BM: 2x(3x60")]**    **Task-1**:  Solving the problem of the set  **[BT: 2x(3x60")]** | | 1. Set definiton  2. Set presentation  3. Cardinality  4. Various sets  5. Operation of the set  6. Set laws  7. 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 propositions  2. Accuracy of explaining tautology and contradictions  3. Accuracy explains the properties and laws of mathematical logic  4. Accuracy explains the inference and steps in concluding an argument  5. Accuracy of explaining elemental reasoning and deduction | | | **Criteria:**  1. Quiz assessment  2. Task assessment | **Lecture**:  Presentation  **[TM: 2x(3x50")]**    Mandiri  **[BM: 2x(3x60")]**    **Task-2**  Pcompletion of the question of mathematical logic  **[BT: 2x(3x60")]** | | 1. Proposition  2. Compound proposition  3. Tautology and contradictions  4. Nature and Laws of the logic proposition  5. Inference  6. 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 relationships  2. Breadth and sharpness explain how to combine relationships  3. Accuracy of explaining the composition and properties of relationships  4. Accuracy determines equality and partial sorting relationships  5. Accuracy in explaining relationship closure | | | **Criteria:**  1. Quiz assessment  2. Task assessment | **Lecture**:  Presentation  **[TM: 2x(3x50")]**    Mandiri  **[BM: 2x(3x60")]**    **Task-3**  Solving the problem of Relation  **[BT: 2x(3x60")]** | | 1. Relationship representation  2. Inverse relationships  3. Combining relationships  4. Relationship composition  5. Traits of relationships  6. Equality and partial sorting relationships  7. 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 calculating  2. The breadth and sharpness of explaining the expansion of counting rules  3. Accuracy explains the concept of permutations and combinations  4. Breadth and sharpness in explaining permutations and combinations of common forms  5. Accuracy in explaining combinations with repetition  6. Breadth and sharpness in explaining Binomial coefficient  7. Accuracy in explaining the principle of bird nests and discrete opportunities | | | **Criteria:**  1. Quiz assessment  2. Task assessment | **Lecture**:  Presentation  **[TM: 2x(3x50")]**    Mandiri  **[BM: 2x(3x60")]**    **Task-4**  The completion of the question of  Relationship  **[BT: 2x(3x60")]** | | 1. Basic Rules of Calculating  2. Expansion of Counting Rules  3. Permutations  4. Combination  5. Permutations and Combinations of Common Forms  6. Combination with Repetition  7. Binomial Coefficient  8. Bird's Nest Principle  9. 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 expression  2. Accuracy explains the principle of duality  3. Breadth and sharpness in explaining boolean algebra laws  4. Accuracy in explaining the function and complement of boolean function  5. Breadth and sharpness in explaining canonical forms  6. Accuracy of using boolean algebra in the calculation of informatics field | | | **Criteria:**  1. Quiz assessment  2. 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 algebra  2. Boolean expression  3. Duality principle  4. Boolean algebraic laws  5. Boolean function  6. Complement of boolean functions  7. Canonical form  8. Boolean algebra application  Simplification 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 properties  2. Accuracy of explaining terminology and graph representation  3. Accuracy of explaining isomorphic graphs  4. The breadth of explaining the planar graph and graph field  5. Accuracy of explaining track definition and Euler circuitry  6. Accuracy explains hamilton's track and circuit defects  7. Accuracy in using graph applications in the field of informatics | | | **Criteria:**  1. Quiz assessment  2. 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 definiion  2. Types of graphs  3. Graph terminology  4. Some special simple graphs  5. Graph representation  6. Isomorphic graph  7. Graf planar and graph fields  8. Track and Euler circuit  9. Hamilton track and circuit  10. 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 trees  2. Accuracy determines in a tree coloring  3. Accuracy of explaining the stretched tree  4. Accuracy of explaining rooted tree terminology  5. Accuracy of explaining binary and traversal trees  6. Accuracy in explaining tree expressions  7. Accuracy determines the value of the Huffman code  8. Accuracy in determining the value of Binary Search Tree | | | **Criteria:**  1. Quiz assessment  2. Task assessment | **Lecture**:  Presentation  **[TM: 2x(3x50")]**    Mandiri  **[BM: 2x(3x60")]**    **Task-7**: Solvingthe problem of trees  **[BT: 2x(3x60")]** | | 1. Defenition and Tree Properties  2. Tree coloring  3. Tree Stretching minimum  4. Rooted Tree Terminology  5. Binary and Traversal Trees  6. Tree of Expression  7. Huffman Code  8. 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.