**UNIVERSITAS NEGERI PADANG**
FACULTY OF MATHEMATICS AND NATURAL SCIENCES MATHEMATICS DEPARTMENT, MATHEMATICS STUDY PROGRAM Main Campus Universitas Negeri Padang.
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| Module name: | Operational Research |
| Module level,if applicable: | Bachelor |
| Code: | MAT1.62.5004 |
| Subheading,if applicable: | - |
| Classes,if applicable: | Operational Research |
| Semester: | $5^{th}$ (fifth) |
| Module coordinator: | Head of Applied Mathematics Expertise Group |
| Lecturer(s): | Rara Sandhy Winanda. S.Pd., M.Sc, Defri Ahmad, S.Pd., M.Si, and Dina Agustina, S.Pd., M.Sc. |
| Language: | Indonesian Language and English |
| Classification within the curriculum: | Compulsory course in the third year (5th semester) Bachelor Degree |
| Teaching format / class hours per week during the semester: | a. Lectures : Problem Based Learning with methods such as expository, discussion, and presentation. (4 x 50 minutes = 200 minutes)<br>b. Structured assignment : Weekly individual written assignment. (4 x 60 minutes = 240 minutes).<br>c. Individual study (4 x 60 minutes = 240 minutes). |
| Workload: | The total workload is 181.33 hours per semester, which consists of 200-minute lectures, 240-minute structured assignment, and 240 minutes of individual study. In total, there are 16 weeks per semester, including midterm and final exams. |
| Credit points: | 4 sks = 6.04 ECTS |
| Prerequisites course(s): | Elementary Linear Algebra |
| Course Outcomes: | After taking this course, the students have ability to:<br>CO1. Formulate a real-world problem as a linear programming model.<br>CO2. Analyze the theoretical workings of the graphical and simplex methods.<br>CO3. Examine the connection between a linear program and its dual.<br>CO4. Perform sensitivity analysis to identify the direction and magnitude of change of the optimal solution of linear programming models. |

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| | CO5. Using appropriate methods, construct and solve transportation problems.<br>CO6. Evaluate and compare various nonlinear optimization methods. |
| Content: | 1. Two-variable linear programming model<br>2. Simplex methods<br>3. Dual problems<br>4. Post-optimal analysis<br>5. Transportation model<br>6. Non-linear programming. |
| Study/exam achievements: | The final grade will be weighted as follows:<br><br>The assessment consists of a final exam (30%), a midterm exam (30%), task (20 %), and presentation/ discussion (20%).<br><br>The final and midterm exams are essay tests with a closed book (120 minutes).<br><br>In class, students use the concept of optimization to discuss the applied issue. Students present the special topic and write a report on the discussion at the end of the semester in groups. Each student gets a weekly assignment as an individual or group. |
| Forms of media: | White Board, laptop, Projector, e-learning via elearning2.unp.ac.id, and zoom meeting. |
| Literature: | Main:<br>1. Hamdy A. Taha, 2007, Operations Research an Introduction, 8th Ed, Prentice-Hall, Pte Ltd, Singapore.<br>2. Wayne L. Winston, 2004, Operation Research Application and Algorithms, Ruxbury Press.<br>Recommended<br>1. John A. Lawrence and Barry A. Pasternack, 2006, Applied Management Science, John Wiley &Sons Inc. |

**PLO and CO Mapping**

| | PLO1 | PLO2 | PLO3 | PLO4 | PLO5 | PLO6 | PLO7 | PLO8 | PLO9 | PLO10 |
|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | | | ✔ | | | | | | | |
| **CO2** | | | | | | | | | ✔ | |
| **CO3** | | | | | | | | | ✔ | |
| **CO4** | | | | | | | | | | ✔ |
| **CO5** | | | | | | ✔ | | | | |
| **CO6** | | | ✔ | | | | | | | |