Module designation	*Optimization and Control Theory*
Semester(s) in which the module is taught	*6*
Person responsible for the module	*Fitriana Yuli Saptanningtyas S.Pd, M.Si.*
Language	*Bahasa Indonesia*
Relation to curriculum	*Elective course*
Teaching methods	*150 minutes lectures and 180 minutes structured activities per week.*
Workload (incl. contact hours, self-study hours)	*Total workload is 136 hours per semester which consists of 150 minutes lectures, 180 minutes structured activities, and 180 minutes self-study per week for 16 weeks.*
Credit points	*3*
Required and recommended prerequisites for joining the module	*MAT6324 - Mathematical Modelling*
Module objectives/intended learning outcomes	*Students know that/know how to/are able to* *CO1. Uphold academic and professional ethics in solving optimization and control problems.* *CO2. Master the basic concepts of mathematics and programming required in optimization.* *CO3. Formulate mathematical models for optimization problems.* *CO4. Collaborate to solve optimization problems and communicate the results.* *CO5. Conducting exploration to solve optimization and control problems.* *CO 6. Using the appropriate program to solve optimization and control problems.*

<table>
<tr><td>Content</td><td>The Optimization and Control Theory course provides a foundation in optimization methods and control theory. Optimization in unconstrained and constrained nonlinear programming will be studied. Analytical methods for solving unconstrained nonlinear optimization using the Lagrange method will be studied, while Kun Tuchker's conditions for inequality-constrained optimization problems will also be studied. In addition, numerical methods for solving nonlinear optimization problems are studied, namely the Newton method, Steepest Descent for solving both single-variable and multi-variable optimization problems, as well as quadratic programming, interior point methods, and Hessian matrices. Topics in optimal control include dynamic systems, the shooting method, and Pontyagrin's minimum principle.</td></tr>
<tr><td>Examination forms</td><td>CO1: Attitude assessment is carried out at each meeting by observation and / or self-assessment techniques using the assumption that basically every student has a good attitude.</td></tr>
<tr><td>Study and examination requirements</td><td>The student is given a value of very good or not good attitude if they show it significantly compared to other students in general. The result of attitude assessment is not a component of the final grades, but as one of the requirements to pass the course. Students will pass from this course if at least have a good attitude.

The final mark will be weight as follow:
<table>
<tr><th>No</th><th>CO</th><th>Assessment Object</th><th>Assessment Technique</th><th>Weight</th></tr>
<tr><td>1</td><td>CO 1</td><td>a. Presentation
b. Discussion</td><td>Observation</td><td>5%
10%</td></tr>
<tr><td>2</td><td>CO 2, CO 3, CO 4</td><td>a. Individual assignment
b. Group assignment
c. Quiz
d. Midterm
e. Final test</td><td>Written</td><td>10%
10%
20%
20%
25%</td></tr>
<tr><td colspan="4">Total</td><td>100%</td></tr>
</table></td></tr>
</table>

Reading list	*1. A. Winston, W.L. 2004. Operations Research Applications and Algorithm. 4th edition. Belmont: Thomson Brooks/Cole.* *2. B. Bazaraa, M.S. Sherali, H.D, dkk 2006, Non Linear Programming, John Wiley and Sons* *3. C. Edwin K.P. Chong dkk. 1996, An Introduction to Optimization, John Wiley and Sons* *4. D. Lewis, F., 1992, Applied Optimal Control, Prentice Hall International* *5. E. Olsder,G.J. Van der Woude, dkk.. 2011, Mathematical System Theory, Delft University of Technology* *6. Saptayaningtyas, F.Y., Andayani, S. 2022. Optimal Kontrol pada Model Matematika Sel Kanker dengan Terapi Sistem Imun*