Undergraduate Programme in Mathematics

Module name: Elementary Differential Equations

Module level, if applicable: Bachelor

Code, if applicable: MMM-2301

Subtitle, if applicable: Elementary Differential Equations

Semester(s) in which the module is taught: 3rd (third)

Person responsible for the module: Chair of the Lab. of Applied Mathematics

Lecturers: Dr. Fajar Adi Kusumo, M.Si., Dr. Lina Aryati, M.S., Prof. Dr. Ch. Rini Indrati, M.Si., Dr. Imam Solekhudin, M.Si., Prof. Dr. Widodo, M.S., Dr. Sumardi, M.S.

Language: Bahasa Indonesia

Relation to curriculum: Compulsory course in the second year (3rd semester) Bachelor Degree

Type of teaching, contact hours: 150 minutes lectures and 180 minutes structured activities (homework and task) per week.

Workload: Total workload is 136 hours per semester, which consists of 150 minutes lectures per week for 14 weeks, 180 minutes structured activities per week, 180 minutes individual study per week, in total is 16 weeks per semester, including mid exam and final exam.

Credit points: 3

Requirements according to the examination regulations: Students have taken Elementary Differential Equations course (MMM-2301) and have an examination card where the course is stated on.

Recommended prerequisites: Students have taken Calculus II course (MMM-1102) and have participated in the final examination of the course. Before taking this course, students must have a good understanding about concepts of limit, derivative, and integral.

Module objectives/intended learning outcomes:

Upon successful completion, students will have:

CO1. ability to solve the types of Ordinary Differential Equations (ODE), e.g. separable differential equations, exact and non-exact differential equations, linear differential equations, linear system of Differential Equations, etc.

CO2. ability to solve $n$-order linear differential equations.

CO3. ability to solve the differential equations about ordinary points using power series.

CO4. ability to solve linear system of ODE using differential operator and matrices methods.

CO5. Ability to prove some properties of Laplace transform and to apply the properties of Laplace transform, then to solve differential equations with initial conditions and linear systems with constant coefficients with initial conditions.

Content:

a. Introduction:
   i. Motivation of emergence of differential equations from real life problems.
   ii. Definition of differential equations and their solutions.

b. First order differential equations: separable equations, homogeneous equations, exact equations and integrating factors, linear equations, Bernoulli’s differential equation.

coefficients, the method of variation of parameters-, the method of differential operators (optional), Cauchy-Euler equations.

d. Series solutions.
e. Systems of differential equations and their methods of solution.
g. Simple applications of differential equations.

Study and examination requirements and forms of examination
The final mark will be weighted as follows:

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<tr>
<th>No.</th>
<th>Assessment methods (components, activities)</th>
<th>Weight (percentage)</th>
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<tbody>
<tr>
<td>1</td>
<td>Final Examination</td>
<td>35</td>
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<td>2</td>
<td>Mid-Term Examination</td>
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<td>3</td>
<td>Presentation</td>
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<td>4</td>
<td>Class Activities: Quiz, Homework, etc.</td>
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The initial cut-off points for grades A, B, C, and D should not be less than 80%, 70%, 50%, and 40%, respectively.

Media employed
White/Black Board, LCD Projector, Laptop/Computer, e-Learning via http://elisa.ugm.ac.id

Reading List

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<tr>
<th>PLO 1</th>
<th>PLO 2</th>
<th>PLO 3</th>
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PLO and CO Mapping