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Master in Mathematics

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MODULE HANDBOOK

Module Name	Boundary Value Problem (Masalah Syarat Batas)
Module level, if applicable	*Master Program*
Code, if applicable	*MMM 5307*
Subtitle, if applicable	
Courses, if applicable	Boundary Value Problem (Masalah Syarat Batas)
Semester(s) in which the module is taught	*1st semester*
Person responsible for the module	*Chair of Applied Mathematics Research Group*
Lecturer(s)	*Prof. Dr. Bambang Sudjijono*
Language	*Bahasa Indonesia*
Relation to curriculum	*Master Degree in Mathematics, Elective, 1st semester*
Teaching methods	*lecture, project, seminar*
Workload (incl. contact hours, self-study hours)	• *3x50 minutes lectures,* • *3x50 minutes structured activities,* • *3x50 minutes individual study,* • *In 16 weeks per semester (including mid-term and final examinations).* • *Total: 144x50 minutes per semester*
Credit points	*3*
Required and recommended prerequisites for joining the module	-

<table>
<tr><td>Module objectives/intended learning outcomes</td><td>After completing this course the students should have:

CO 1 model the vibrating the string and the circular membrane and solve the models

CO 2 Solve initial value problems by the Integral Transform

CO 3 Solve initial boundary value problem by Fourier-Legendre series

CO 4 Solve initial boundary value problem by Green function

CO 5 Understand conservation law</td></tr>
<tr><td>Content</td><td>Review of second order linear partial differential equation : classification and reduction in canonical form of the second order linear partial differential equation. The solution of Cauchy problem for Hyperbolic equation in canonical form. Exponential Fourier series, Fourier integral, Legendre-Fourier series and their applications. Wave equation: vibrations on a thin rectangular membrane, vibrations of a Circular Membrane. Heat equation: Uniqueness solution, Gauss Kernel method, Temperature in steady condition in rectangular. in circular plate, in spherical, Laplace equation: harmonic function. Green function in Laplace equation, Helmholtz Operator, wave equation, heat equation. conduction of heat in a rod. Nonlinear conservation law: discontinue solution, Traffic model, Cole-Hoft transformation.</td></tr>
<tr><td>Examination forms</td><td>essay</td></tr>
<tr><td>Study and examination requirements</td><td>To pass this course, students must obtain a minimum grade of D. The final mark will be weighted as follows:
<table>
<tr><th>No</th><th>Assessment method</th><th>Weight</th><th>Cognitive</th><th>Project/Case base</th></tr>
<tr><td>1.</td><td>Final Examination</td><td>40</td><td>15</td><td>25</td></tr>
<tr><td>2.</td><td>Mid-Term Examination</td><td>30</td><td>15</td><td>15</td></tr>
<tr><td>3.</td><td>Quiz, Homework</td><td>30</td><td>15</td><td>15</td></tr>
<tr><td></td><td>TOTAL</td><td>100</td><td>45</td><td>55</td></tr>
</table></td></tr>
<tr><td>Media employed</td><td>Board, LCD Projector, Laptop/Computer</td></tr>
</table>

Reading list	1. *R V Churchill, 2012, Fourier Series and Boundary Value Problems, MV Graw Hill Book Compnay, New York* 2. *J. Ray Hanna and John H. Rowland 1990, Fourier Series and Integrals of Boundary Value Problems, 2nd Edition, Dover Publication, Inc., New York.* 3. *Power, D. L., 2010, Boundary Value Problems and Partial Differential Equations, Elsevier Inc., San Diego, California.* 4. *K. M. Humi, and W. B. Miller, 1992, Boundary Value Problems and Partial Differential Equations, PWS-KENT Publishing Company, Boston* 5. *Paul DuChateau, and David W. Zachmann, 1986, Partial Differential Equations, McGraw-Hill, New York.* 6. *Frederic H Miller , 1960, Partial Differential Equations, John Wiley and Sons, Inc., New York*

CO-PLO Mapping

	CO 1	**CO 2**	**CO 3**	**CO 4**	**CO 5**
PLO 1	V	V	V	V	V
PLO 2	V	V	V	V	V
PLO 3	V	V	V	V	V
PLO 4					
PLO 5	V				V
PLO 6					

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