

Applied Mathematics 1

Basic Course Information			
Course Number	3105015	Subject Category	Compulsory/GI
Class Format	Lecture	Credit Type and Number of Credits	1
Department	Mechatronics	Student Category	Year 3
Period of Study	Semester 1	Classes per Week	2
Required Materials	"Mathematics A" by M. Kobayashi, A. Shimizu, Y. Ichikawa, and M. Sakaguchi (primary) and "Elementary Differential Equations and Boundary Value Problems" 11th ed. by W. E. Boyce, R. C. DiPrima, and D. B. Meade (optional)		
Instructor	Haruhiko Semmetsu	Adviser	Daouda

Courses Objective	
When successfully complete this course, students will be able to	
1.	understand the meaning of differential equations and construct the differential equations for a given phenomenon
2.	solve various 1st-order ordinary differential equations
3.	solve various 2nd-order ordinary differential equations

Evaluation/Hubrid	Ideal Level of Achievement (Very Good)	Standard Level of Achievement (Good)	Unacceptable Level of Achievement (Fail)
Evaluation 1	Students can fully explain the meaning of differential equations and accurately construct the differential equation for a given phenomenon.	Students can partly explain the meaning of differential equations and partly construct the differential equation for a given phenomenon.	Students can't partly explain the meaning of differential equations and can't construct the differential equation for a given phenomenon.
Evaluation 2	Students can solve various complex 1st-order differential equations.	Students can solve various basic 1st-order differential equations.	Students can't solve various basic 1st-order differential equations.
Evaluation 3	Students can solve various complex 2nd-order differential equations.	Students can solve various basic 2nd-order differential equations.	Students can't solve various basic 2nd-order differential equations.

Relationship with Learning Outcomes	
G(1)	Wide knowledge on Science and Engineering and practical ability to apply them to solve problems in the society.
GI4	Creativity to make a new value with fusing the knowledge from various fields.

Teaching Method	
Outline	Repeat of Lecture - Drill - Presentation
Class Format	
Please Note	The class schedule will be changed based on student conditions and more.

Course Plan	Semester 1	Contents and Method of Course	Goals	Related MCO
1st Week		Introduction to the 1st-order linear ordinary differential equations	Students can explain what the differential equation is and draw direction slope field.	1, 1, 79
2nd Week		Method for solving 1st-order linear ODEs: Direct Integration	Students can solve the 1st-order ordinary differential equation using direct integration method.	1, 1, 79
3rd Week		Method for solving 1st-order linear ODEs: Separation of Variables	Students can solve the 1st-order ordinary differential equation using separation of variables method.	1, 1, 79
4th Week		Method for solving 1st-order homogeneous linear ODEs	Students can identify and solve homogeneous equations.	1, 1, 80
5th Week		Method for solving 1st-order nonhomogeneous linear ODEs: Variation of Parameters	Students can identify and solve nonhomogeneous linear equations using variation of parameters.	1, 1, 80
6th Week		Method for solving 1st-order nonhomogeneous linear ODEs: Integrating Factor	Students can identify and solve nonhomogeneous linear equations using integrating factor.	1, 1, 80
7th Week		NO CLASS		
8th Week		Review		1, 1, 79 1, 1, 80
9th Week		Midterm examination	Week 1-8	
10th Week		Introduction of the 2nd-order ordinary differential equations	Students can understand the characteristics of 2nd-order ordinary differential equations.	1, 1, 81
11th Week		Method for solving 2nd-order ODEs: Reduction of Order	Students can solve the 2nd-order ordinary differential equations using reduction of order method.	1, 1, 81
12th Week		HOLIDAY		
13th Week		Fundamental set of solutions	Students understand Fundamental set of Solutions and the Wronskian	1, 1, 81
14th Week		Method for solving 2nd-order homogeneous linear ODEs with constant coefficient: Characteristic Equations	Students can solve the 2nd-order homogeneous linear equations with the constant coefficients.	1, 1, 81
15th Week		Method for solving 2nd-order nonhomogeneous ODEs: Undetermined Coefficients	Students can solve the 2nd-order nonhomogeneous linear ODEs with the constant coefficients using the undetermined coefficients method.	1, 1, 81
16th Week		Method for solving 2nd-order nonhomogeneous ODEs: Variation of Constants	Students can solve the 2nd-order nonhomogeneous linear ODEs with the constant coefficients using the variation of constants method.	1, 1, 81
17th Week		System of 1st-order Linear ODEs	Students can solve the system of 1st-order linear ODEs.	1, 1, 80 1, 1, 81
18th Week		Review		
19th Week		Final Examination	Week 10-18	
20th Week		Return answer-sheets. Review semester and feedback	Summary	

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	Examination	Class Participation	Drill Submission
Basic Ability	10	10	10
Technical Ability	0	0	0
Interdisciplinary Ability	0	0	0