



Differential Equation



Course Description

Country	Institution	Course	Credit
KOR	Korea Military Academy	Differential Equation	3
Service	Minimum Qualification of Instructors <ul style="list-style-type: none"> ▪ Ph. D. in Mathematics or related fields (Sub-field : Analysis) ▪ Experience in conducting academic lectures in English ▪ Must be capable of teaching subjects in English 		
Army			
Language			
English			
Prerequisite for International Participants		Content of the Course	
<ul style="list-style-type: none"> ▪ Must be capable of reading academic texts, participating in discussions, and delivering oral presentations in English. ▪ Prior Knowledge : basic knowledge of calculus 		This course introduces fundamental methods for modeling and solving ordinary differential equations (ODEs) that arise in science and engineering. Topics include first-order and higher-order differential equations, systems of equations, Laplace transforms, and series solutions. Students will learn to formulate mathematical models, apply analytical techniques, and interpret results in applied contexts.	
Learning outcomes	Knowledge	Understand fundamental concepts of ordinary differential equations Apply ODEs to real-world problems in science and engineering	
	Skills	Construct and analyze mathematical models using differential equations Solve initial value problems and systems using analytical techniques	
	Responsibility and autonomy	Independently analyze complex problems and select appropriate solution methods	
Verification of learning outcomes			
This course develops students' ability to model dynamic systems and solve differential equations using analytical methods. Learning outcomes are verified through homework assignments and written midterm and final exams. These assessments evaluate students' conceptual understanding, problem-solving proficiency, and ability to apply mathematical reasoning to practical scenarios.			
Course Details			
Main Topic		Hours	Details
1 st order linear DE		3	Basic mathematical modeling; separable DE; 1 st order linear DE
Exact DE		3	Exact DE; Integrating factors
Applications for 1 st order DE		3	Homogeneous / Bernoulli Equations; Modeling with 1 st order DE
Higher order linear DE		3	Homogeneous DE with constant coefficients
Nonhomogeneous DE		3	The method of undetermined coefficients; variation of parameters
Cauchy-Euler DE		3	Reduction of orders / Cauchy-Euler DE
Series solutions of DE		3	Series solutions near a regular singular point; Bessel's equation
Midterm exam		3	Written midterm exam
Systems of 1 st order linear DE		3	Matrix algebra; homogeneous lin. systems w/ const. coefficients
Nonhomogeneous lin. Systems		3	The method of undetermined coefficients; variation of parameters
Applications to systems of DE		3	Lanchester DE
The Laplace transform		3	Definition of Laplace transform
Solution of IVP		3	Solving IVP using (inverse) Laplace transform
Step functions		3	Translation theorems; Laplace transform of period functions
Final exam		3	Written final exam
Total Lecture		45	