



Strategic Studies and Defense Analysis



Course Description

Country	Institution	Course	Credit
KOR	Korea Military Academy	Strategic Studies and Defense Analysis	3
Service	Minimum Qualification of Instructors		
Army	<ul style="list-style-type: none"> ▪ Ph. D. in Mathematics or related fields (Sub-field : Applied Mathematics or Statistics) 		
Language	<ul style="list-style-type: none"> ▪ Experience in conducting academic lectures in English 		
English	<ul style="list-style-type: none"> ▪ Must be capable of teaching subjects in 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 		<p>This course provides future Army officers with a quantitative framework for military decision-making and combat analysis. Students apply differential equations, probability theory, and operations research to analyze and evaluate combat scenarios.</p>	
Learning outcomes	Knowledge	Understand fundamental principles of combat modeling and simulation Apply Lanchester models to evaluate force attrition and battle outcomes	
	Skills	Formulate target detection and Lanchester-type differential equation models Analyze stochastic combat scenarios using quantitative methods	
	Responsibility and autonomy	Independently integrate mathematical reasoning into operational planning and apply quantitative tools to support military command decisions	
Verification of learning outcomes			
<p>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 a written final examination (40%). These assessments evaluate students' understanding of combat models, proficiency in formulating and solving quantitative problems, and ability to apply mathematical reasoning to operational scenarios.</p>			
Course Details			
Main Topic	Hours	Details	
Introduction:	3	Basic mathematical modeling; separable DE; 1 st order linear DE	
Target Acquisition (1): Simple Search	3	Simple search; detection under uncertainty (2.1–2.2)	
Applications for 1 st order DE	3	Systems of ODEs; Lanchester equations as differential systems	
Target Acquisition (2): Continuous Search	3	Intermittent detection; continuous search (2.3–2.5)	
Target Acquisition (3): Detection Probability	3	Detection probability in designated areas; Quiz #1 (2.6)	
Lanchester Deterministic Models (1): Basic Model	3	Attrition rates; basic Lanchester combat model (3.1–3.2)	
Lanchester Deterministic Models (2): Area Fire Law	3	Area fire model (3.3–3.4)	
Lanchester Models (3): Guerrilla & Automatic Weapon Models	3	Guerrilla warfare model; automatic weapon fire model and extensions; Quiz #2 (3.4–3.6)	
Stochastic Combat Models (2): Direct Fire & Area Fire	3	Written midterm examination covering target detection and Lanchester models	
Review & Final Examination	3	Review of stochastic models and combined arms models; written final examination	
Midterm Exam	3	Written midterm examination	
Differential Equations (1)	3	Sequential combat model(4.1–4.2)	
Differential Equations (2)	3	Continuous stochastic combat models (4.3–4.4)	
Stochastic Combat Models (1): Sequential & Continuous	3	Large-unit direct fire model; superiority parameter; combined arms area fire; Quiz #3 (5.1–5.3)	
Final Exam	3	Written final examination	
	45		