

Course: Math -4203, Course Title: Mathematical Modeling	Credit Hour: 03	Year: 4th	Term: II
<p>Rationale: Mathematical modeling is an area of applied mathematics that uses mathematical tools for exploring and studying "real world" problems. Mathematical models describe a variety of real-world situations, providing unique information and insight. Systems that can benefit from modeling range from daily occurrences (e.g. optimizing daily needs) to highly complex interactions (e.g. predicting weather) to currently theoretical scenarios (e.g. computing the best vaccination or treatment strategy of infectious diseases). Based on the importance of modeling to real situations, this course is designed for 4th year students to provide them modeling concepts, their constructions and implementation to problems arising in real world situations.</p>			
<p>Course Objectives: The overall objective of this course is to provide an introduction to the process of mathematical modeling while giving students an opportunity to</p> <ul style="list-style-type: none"> • develop and construct appropriate models for various problem situations, • analyze given models to uncover underlying assumptions, and • investigate particular problems to find out what has already been done toward developing solutions. 			
Intended Learning Outcomes (ILOs)		Course Content	
<p>At the end of the course the students will be able to</p> <ul style="list-style-type: none"> • increase their fluency in technical reading and writing, and develop skills in mathematical problem solving, • use the modeling process to translate problem situations to mathematical expressions, • use a variety of mathematical resources and tools to study problem situations, • use appropriate technology to assist in the problem-solving process. • learn how to identify a problem, construct or select appropriate models, figure out what data needs to be collected, test the validity of a model. • promote their creativity and demonstrate the link between theoretical mathematics and real world applications. 		Section – A	
		Concepts of modeling and mathematical modeling, Dynamical systems, Modeling processes, Nature of mathematical model, Scopes of mathematical modeling. Mathematical modeling through first order ODEs, Mathematical modeling through system of first order ODEs, Mathematical modeling through PDEs.	
		Section – B	
		Mathematical modeling through difference equations, Mathematical modeling through graphs, Mathematical modeling through integral, Modeling through delay-differential and differential equations, Mathematical modeling through mathematical programming. .	