	Course name: MATH427 Mathematical Modeling			**Department:** Mathematics			Semester 7	
	Methods of Education						Credit (ECTS)	
	Lecture	Recitation/ (Etud)	Lab	Exams	Homework/ Quiz	Other	Total	6
	42	0	0	40	0	98	180	
Language	English							
Compulsory/Elective	Compulsory							
Prerequisites	None							
Course Contents	Basics of derivation of differential equations for exponential growth and other simple models, exponential growth, logistic equation changing variables, rescaling time, modeling examples: Interacting population problems, predator-prey models, competition models, mutualism or symbiosis models, steady-states, linerization, stability analysis, vector fields, phase planes, introduction to partial differential equations models.							

Weekly Detailed Course Contents

Weeks	Subjects
1	Basics of derivation of differential equations for exponential growth and other simple models
2	Basics of derivation of differential equations for exponential growth and other simple models
3	Exponential growth
4	Logistic equation changing variables
5	Rescaling time, modeling
6	Interacting population problems
7	Predator-prey models
8	Competition models
9	Mutualism or symbiosis models
10	Vector fields, phase planes
11	Steady-states, linerization, stability analysis
12	Steady-states, linerization, stability analysi
13	Phase planes
14	Introduction to partial differential equations models.

Course Objectives

The purpose of this course is to

- provide an understanding of the applications of mathematics to the real life problems.
- to explain the applications in different disciplines such as biology, ecology and medicine with mathematical models with single variable.
- to be able to maket he linerization, stability analysis of the resulting model.

Learning Outcomes and Competences

Upon completion of this course students

- knows the basics for the derivation of differential equations for simple models with one variable like exponential growth, logistic growth.
- can construct the simple mathematical models such as predator-prey models, competition models, mutualism or symbiosis models.

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- can make the linerization for the corresponding models.
- are able to make stability analysis.
- knows the basics of the partial differential equation models.

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<tr><td>Textbook and /or References</td><td colspan="3">

Main texbooks :

- N. F. Britton, Essential mathematical biology, Springer.
- G. Vries, T. Hillen, M. Lewis, J. Müller, B. Schönfisch, A course in mathematical and computational models, SIAM Mathematical Modeling and Computation.

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<tr><td rowspan="9">Assessment Criteria</td><td></td><td>If any, mark as (X)</td><td>Percentage (%)</td></tr>
<tr><td>Midterm Exams</td><td>X</td><td>40</td></tr>
<tr><td>Quizzes</td><td></td><td></td></tr>
<tr><td>Homeworks</td><td></td><td></td></tr>
<tr><td>Projects</td><td></td><td></td></tr>
<tr><td>Term Paper</td><td></td><td></td></tr>
<tr><td>Laboratory work</td><td></td><td></td></tr>
<tr><td>Other</td><td></td><td></td></tr>
<tr><td>Final Exam</td><td>X</td><td>60</td></tr>
<tr><td>Instructors</td><td colspan="3"></td></tr>
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