Course Title	Code	Semester	Theoretical (hours/week)	Practice (hours/week)	Laboratory (hours/week)	ECTS
MATHEMATICAL MODELS IN BIOLOGY	**BIS616**	**1, 2, 3 or 4**	**3**	**0**	**0**	**5**
Prerequisites	-					
Course Language	Turkish					
Course Type	Elective					
Teaching Methods	Lecture, Question & Answer, Practice					
Instructor(s)						
Course Objective	To teach some basic concepts in analysis and algebra and how to use basic mathematical concepts such as difference equations and probability theory in different biological cases					
Course Learning Outcomes	At the end of this course, the students are; 1. able to express the models as theoretical, 2. able to write population models, 3. able to interpret population models, 4. able to solve linear or non-linear dynamic systems.					
References	1. Linda JS. Allen, An Introduction to Mathematical Biology, Pearson Prentice Hall, 2007.					

WEEKLY COURSE TOPICS

Weeks	DISCUSSION TOPICS TO BE PROCESSED
1.	Functions and Mathematical Modeling: Linear Models: mRNA Ratio, Quadratic Models: Epidemics
2.	Rational and Allometric Models: Enzyme Kinetics, Drug Concentration, Average AIDs Cases
3.	Discrete-time Dynamical Systems: Cobwebbing, Equilibrium and Stability, Drug Concentration
4.	Biological Applications of Difference Equations
5.	Discrete Exponential and Logistic Growth: the Growth of Fungus Cells and the Spread of the Disease
6.	Biological Applications of Differential Equations: Harvesting Population I
7.	**Mid-Term Examination**
8.	Biological Applications of Differential Equations: Harvesting Population II
9.	Predator-Prey Models, Race Models
10.	Epidemic Disease Models, Genetic Models of Epidemics
11.	Petri Nets
12.	Stochastic Petri Nets
13.	Biological Applications of Petri Nets I
14.	Biological Applications of Petri Nets II
15.	**Final Exam**

ECTS / WORK LOAD TABLE

Activities	**Number**	**Duration**	**Total Work Load**
Course	14	3	42
Laboratory			
Practice			
Field Study			
Outclass course work hours (Self working / Teamwork / Preliminary work)	14	4	56
Presentations (Video preparation / Poster preparation / Oral presentation / Focus group discussion / Applying questionnaire/ Observation and report writing)			
Seminars			
Project			
Case study			
Role playing, dramatization			
Preparing and criticizing article			
Semester midterm exams	2	10	20
Semester final exams	1	7	7
Total Work Load (hour) / 25(s)	**125/25**		
ECTS	**5**		

EVALUATION SYSTEM

Midterm Studies	**Number**	**Contribution**
Midterm exam	1	%25
Quiz		
Laboratory		
Practice		
Field Study		
Specific practical training (If exists)		
Homework assignment	1	%25
Presentation and seminar		
Projects		
Other evaluation methods		
Total of Midterm Studies		%50
Final Studies		
Final	1	%50
Homework assignment		
Practice		
Laboratory		
Total of Final Studies		%50
Contribution of midterm studies to course grade		%50
Contribution of final studies to course grade		%50
Total Grade		100

RELATIONSHIPS BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM QUALIFICATIONS

Program Qualifications		Learning Outcomes			
		LO1	**LO2**	**LO3**	**LO4**
1.	Based on his/her previous qualifications, develops and deepens the current and advanced information, methods and practices in the field at the level of expertise with original thought and/or research.	**3**	**3**	**3**	**3**
2.	Develops new ideas and methods related to the field by using higher-order mental processes such as creative and critical thinking, problem solving and decision making.	**2**	**2**	**2**	**2**
3.	Understands the interdisciplinary interaction of the field; reaches original results by using knowledge and research methods that require expertise in analysis, synthesis and evaluation of new and complex ideas.	**3**	**3**	**3**	**3**
4.	Has knowledge about the statistical methods used in the field of health; accurately selects, applies and interprets statistical methods.	**2**	**2**	**2**	**2**
5.	Makes necessary examination by using the technological tools including the computer, the field-specific equipment and tools at the level required by the field of health, and develops creative solutions to problems.	**2**	**2**	**2**	**3**
6.	Extends the boundaries of knowledge in the field by publishing at least one scientific paper related to the field in national and / or international peer-reviewed journals.	**3**	**3**	**3**	**3**
7.	Reviews and assesses a scientific article / research in a critical point of view.	**3**	**3**	**3**	**3**
8.	Takes part in environments that require the resolution of the problems related to the field and other disciplines, and takes the lead when necessary.	**3**	**3**	**3**	**3**
9.	Defends his/her original opinions in discussing the subjects related to field and communicates effectively which shows his/her competence in the field.	**2**	**2**	**2**	**2**
10.	Promotes scientific, technological, social or cultural advancements in the field of health, contributes to the process of becoming and maintaining the society of knowledge of the society in which he/she lives.				
11.	Contributes to the solution of social, scientific, cultural and ethical problems encountered in health related issues and supports the development of these values.				
12.	Uses current developments and information about the field of health for the benefit of the community in accordance with the child, family, national values and the facts of the country.				
13.	Knows the importance of ethical principles and ethical rules for the individual and society, acts in accordance with scientific accuracy and ethical principles.	**2**	**2**	**2**	**2**
14.	Examines and develops the social relations and the norms that direct these relations, from a critical point of view and manages actions for changing them when necessary.				
15.	Communicates written, orally and visually by using a foreign language at advanced level and discusses in that language.	**3**	**3**	**3**	**3**

Contribution to the level of proficiency: 1: Low **2:** Low/Moderate **3:** Moderate **4:** High **5:** Excellent