



T.C.

ESKİŞEHİR OSMANGAZİ ÜNİVERSİTESİ

FACULTY OF SCIENCES

MATHEMATICS AND COMPUTER SCIENCES DEPARTMENT

COURSE INFORMATION FORM

Course Name	Course Code
Applications of Category Theory I	

Semester	Number of Course Hours per Week		Credit	ECTS
	Theory	Practice		
7	2	2		6

Course Category (Credit)				
Basic Sciences	Engineering Sciences	Design	General Education	Social
x				

Course Language	Course Level	Course Type
Turkish	Undergraduate	Elective

<b>Prerequisite(s) if any</b>	
<b>Objectives of the Course</b>	Recognizing Category Theory and using this algebraic structure on other disciplines.
<b>Short Course Content</b>	Definition and Examples of Categories, Functions and Morphisms, Equalities and Isomorphisms, Commutative Diagrams, Functors and Applications, Concepts of Supercategories and Subcategories, Limits and Colimits, Free Categories, Monoid and Group Objects, Modules and Category Theory, Monoidal Categories, Invertible Categories and Groupoids, Haskell and Category Theory, Haskell Applications

Learning Outcomes of the Course	Contributed PO(s)	Teaching Methods *	Measuring Methods **
1 Acquires sufficient knowledge in category theory topics.	1,2	1,2	A
2 Develop the ability to create algorithms to solve problems by using theoretical and practical knowledge.	1,2	1,2	A
3 Develops ability to analyze and solve problems encountered.	3,4,5,9	2,10	A
4 Analytical thinking skills develop and the ability to make individual and independent decisions develops.	3,4,5,9	10,11	A
5 The ability to analyze and interpret data, apply interpretation to other data, and apply this information in a computer environment develops.	13	10,11	A
6			
7			
8			

\*Teaching Methods 1:Expression, 2:Discussion, 3:Experiment, 4:Simulation, 5:Question-Answer, 6:Tutorial, 7:Observation, 8:Case Study, 9:Technical Visit, 10:Trouble/Problem Solving, 11:Individual Work, 12:Team/Group Work, 13:Brain Storm, 14:Project Design / Management, 15:Report Preparation and/or Presentation

\*\*Measuring Methods A:Exam, B:Quiz, C:Oral Exam, D:Homework, E:Report, F:Article Examination, G:Presentation, I:Experimental Skill, J:Project Observation, K:Class Attendance; L:Jury Exam

<b>Main Textbook</b>	Category Theory for Computing Science , M.Barr & C.Wells.
<b>Supporting References</b>	<ol style="list-style-type: none"> <li>1. Category Theory Lecture Notes , M.Barr &amp; C.Wells.</li> <li>2. Categories and Computer Science , R.F.C.Walters.</li> <li>3. Categories for the Working Mathematician , S.Mac Lane.</li> </ol>
<b>Necessary Course Material</b>	

<b>Course Schedule</b>	
<b>1</b>	Programming Languages
<b>2</b>	Fundamental Concepts in Algorithms
<b>3</b>	Data Types and Variables
<b>4</b>	Control Structures and Loops
<b>5</b>	Functions and Procedures
<b>6</b>	Basic Input/Output Operations
<b>7</b>	Error Handling and Debugging Techniques
<b>8</b>	Mid-Term Exam
<b>9</b>	Introduction to Object-Oriented Programming
<b>10</b>	Classes and Objects
<b>11</b>	Recursion and Recursive Algorithms
<b>12</b>	Fundamental Concepts in Memory Management
<b>13</b>	Introduction to GUI Programming
<b>14</b>	Working with Databases: Basic CRUD Operations
<b>15</b>	Projects and Application Development
<b>16,17</b>	Final Exam

<b>Calculation of Course Workload</b>			
<b>Activities</b>	<b>Number</b>	<b>Time (Hour)</b>	<b>Total Workload (Hour)</b>
Course Time (number of course hours per week)	14	3	42
Classroom Studying Time (review, reinforcing, prestudy,...)	14	3	42
Homework	2	1	2
Quiz Exam			
Studying for Quiz Exam			
Oral exam			
Studying for Oral Exam			
Report (Preparation and presentation time included)			
Project (Preparation and presentation time included)			
Presentation (Preparation time included)	2	30	60
Mid-Term Exam	1	2	2
Studying for Mid-Term Exam	1	10	10
Final Exam	1	2	2
Studying for Final Exam	1	20	20
	<b>Total workload</b>		<b>180</b>
	<b>Total workload / 30</b>		<b>6</b>
	<b>Course ECTS Credit</b>		<b>6</b>

Evaluation	
Activity Type	%
Mid-term	50
Quiz	
Homework	
Bir öge seçin.	
Bir öge seçin.	
Final Exam	50
<b>Total</b>	<b>100</b>

RELATIONSHIP BETWEEN THE COURSE LEARNING OUTCOMES AND THE PROGRAM OUTCOMES (PO) (5: Very high, 4: High, 3: Middle, 2: Low, 1: Very low)		
NO	PROGRAM OUTCOME	Contribution
1	The ability to apply knowledges of Mathematics and Computer Sciences,	4
2	To have sufficient theoretical and practical knowledge of Mathematics at international level,	5
3	The ability of describing, modelling and solving of mathematical problems at Mathematics and related subjects,	5
4	The skill to solve and design a problem process in accordance with a defined target,	5
5	Skills to analyze data, interpret and apply to other datum and using these data on computer,	4
6	The skill to use the modern techniques and computational tools needed for mathematical applications,	3
7	The skill to make team work within the discipline and interdisciplinary,	2
8	The ability to improve oneself by following the developments on other modern, scientific and technological subjects as well as Mathematics and Computer Sciences,	2
9	The skill to communicate orally and in written way, in a clear and concise manner by having individual work skills and ability to independently decide and analytical thinking,	4
10	The skill to have professional and ethical responsibility,	2
11	The skill to have consciousness for quality issues and scientific research,	2
12	The skill to be sensitive to environmental issues related with problems and development of living area and consistent in the social relations,	1
13	Ability to solve problems in the working life faced to find an appropriate algoritms via mathematical modeling and to write computer programs,	4
14	The skill to developed design of software systems at different complex levels,	1
15	The credence of necessity of life-long learning and ability to apply the formation long-life learning.	1

LECTUTER(S)				
Prepared by	Prof. Dr. Zekeriya ARVASI			
Signature(s)				

Date:06.06.2024