COURSE SYLLABUS						
Course Title	**Course Code**	**Semester**	**Course Hour/Week**		**Credit**	**ECTS**
Mathematics and Geometry for Design	DSGN 105	I	**Theory** 3	**Practice** 0	3	5
Course Type	Compulsory Courses	Department Elective	Faculty Elective	University Elective	CoHE (YÖK) Compulsory	Other
	X	-	-	-	-	-
Level of Course	Associate Degree (Short Cycle)		Undergraduate (First Cycle)		Graduate/ Doctoral (Second /Third Cycle)	
	-		X		-	

Language of Instruction	English

Course Instructor	Vic Grout	E-mail : vic.grout@arucad.edu.tr Office : TIOFF18		
Course Objectives	This course provides a foundational understanding of mathematical principles and geometric concepts tailored for aspiring architects. Through this course, students explore the mathematical underpinnings essential for architectural design, focusing on their practical applications within the creative process. Topics covered encompass fundamental algebraic concepts, geometric transformations, spatial reasoning, and principles of proportion and symmetry. By mastering these core mathematical and geometric principles, students gain invaluable tools for analyzing, conceptualizing, and communicating architectural ideas effectively.			
Course Learning Outcomes	Students will be able to:		Teaching Methods	Evaluation Methods
	Understand: Demonstrate knowledge and understanding of essential mathematical and geometric definitions.		Lectures, Direct instruction	Midterm Exam, Final Exam
	Understand: Describe relevant mathematical models applied to design.		Lectures, Direct instruction	Midterm Exam, Final Exam
	Apply: Apply appropriate mathematical and geometric solutions to design problems.		Class exercises, Problem-solving practice	Midterm Exam, Final Exam

	Analyze: Produce design solutions demonstrating underlying mathematical and geometric analysis.	Class exercises, Problem-solving practice	Midterm Exam, Final Exam
	Evaluate: Critically compare and contrast appropriate and inappropriate mathematical and geometric approaches to design issues.	Discussion, Class exercises	Final Exam
Course Content	• Numbers, numeric representation, operations, decimals, fractions and percentages • Measurement, approximation and ratios • Shapes, lengths, areas and volumes • Geometry and trigonometry • Algebra, formulae and equations • Vectors and matrices • Combinations, permutations and probability • Introduction to statistics • Introduction to (differential and integral) calculus • Introduction to graphs and graph theory		

COURSE OUTLINE/SCHEDULE			
Week	**Topic**	**Implementation (theory/practice)**	**Required Reading, Preliminary preparation**
1	Introduction: Course structure. Mathematics and geometry in art and design	T	Class notes.
2	Basic numbers and shapes	T	Class notes. Johnson & Neill 'Mathematics: A Complete Introduction: The Easy Way to Learn Maths' Chapter 1 https://www.bbc.co.uk/bitesize/subjects/zfcqn39
3	Operations, functions, decimals, fractions and percentages	T	Class notes Johnson & Neill 'Mathematics: A Complete Introduction: The Easy Way to Learn Maths' Chapter 3 https://www.bbc.co.uk/bitesize/subjects/zfcqn39
4	Introduction to algebra	T	Class notes. Johnson & Neill 'Mathematics: A Complete Introduction: The Easy Way to Learn Maths' Chapter 11 https://mathworld.wolfram.com/topics/Algebra.html

			https://www.bbc.co.uk/bitesize/guides/zfjy6v4/revision/1
5	Geometry 1	T	Class notes. Johnson & Neill 'Mathematics: A Complete Introduction: The Easy Way to Learn Maths' Chapter 2 https://mathworld.wolfram.com/topics/Geometry.html https://www.bbc.co.uk/bitesize/guides/znxytrd/revision/1
6	Geometry 2	T	Class notes. Johnson & Neill 'Mathematics: A Complete Introduction: The Easy Way to Learn Maths' Chapter 4 https://mathworld.wolfram.com/topics/Geometry.html https://www.bbc.co.uk/bitesize/guides/zh6bn9q/revision/1
7	Trigonometry 1	T	Class notes. Johnson & Neill 'Mathematics: A Complete Introduction: The Easy Way to Learn Maths' Chapter 20 https://mathworld.wolfram.com/topics/Trigonometry.html https://www.bbc.co.uk/bitesize/guides/zjkh7yc/revision/1
8	**Review and Midterm**		
9	Trigonometry 2	T	Class notes. Johnson & Neill 'Mathematics: A Complete Introduction: The Easy Way to Learn Maths' Chapter 20 https://mathworld.wolfram.com/topics/Trigonometry.html
10	Vectors	T	Class notes. Class exercises.
11	Matrices	T	Class notes. Class exercises.
12	Counting and probability	T	Class notes. https://mathworld.wolfram.com/topics/ProbabilityandStatistics.html

13	Statistics	T	Class notes. Johnson & Neill 'Mathematics: A Complete Introduction: The Easy Way to Learn Maths' Chapter 22 https://mathworld.wolfram.com/topics/ProbabilityandStatistics.html
14	Calculus	T	Class notes. https://mathworld.wolfram.com/topics/CalculusandAnalysis.html
15	Graph theory	T	Class notes. Class exercises.
16	Exam revision		
17	**Finals**		

Required Course Material(s) / Reading(s)/ Text Book(s)	Neill H., Johnson T., . (2018). Mathematics. London: John Murray Learning. **Call Number :QA39.3 .N44 2018**
Recommended Course Material(s)/ Reading(s) /Other	3rd level Maths - BBC Bitesize: https://www.bbc.co.uk/bitesize/subjects/zfcqn39 Wolfram MathWorld: The Web's Most Extensive Mathematics Resource: https://mathworld.wolfram.com/ Wolfram|Alpha Examples: Mathematics (wolframalpha.com): https://www.wolframalpha.com/examples/mathematics

ASSESSMENT		
Learning Activities	**NUMBER**	**WEIGHT in %**
Mid-Term	1	40
Quiz		
Assignment		
Project		
Field Study		
Presentation / Seminar		

Studio Practice		
Other		
Contribution of Final Examination/Final Project/ Dissertation to the Final Grade	1	60
TOTAL		100

CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAMME LEARNING OUTCOMES

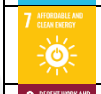
No	**PROGRAMME LEARNING OUTCOMES**	Level of Contribution (1- lowest/ 5- highest)				
		1	2	3	4	5
1	Understand architectural history, theory, and cultural heritage, including the relationship between local/vernacular traditions and global architectural discourse.	X				
2	Understand the technical knowledge and the principles of structural systems, building technology, environmental performance, and construction processes as integrated components of architectural design.		X			
3	Comprehend sustainability, ecological sensitivity, and climate-responsive design principles and their application across different scales of the built environment.	X				
4	Recognize the legal, ethical, and professional frameworks governing architectural practice, including relevant codes, standards, universal ethical values, and the principles of project management and cost estimation.	X				
5	Apply creative and critical design thinking to develop holistic architectural solutions that respond to spatial, environmental, cultural, and social challenges at local, national, and global scales.			X		
6	Produce professional drawings, models, technical documentation, and digital/parametric visualizations that effectively communicate architectural proposals at all stages of design.	X				
7	Conduct systematic, evidence-based research and apply critical evaluation methods to inform and validate design decisions throughout the design process.				X	
8	Integrate interdisciplinary knowledge — spanning art, engineering, ecology, and social sciences — to produce innovative and contextually sensitive design outcomes.		X			

9	Demonstrate professional and ethical responsibility, with sensitivity to environmental sustainability, socio-cultural diversity, and the well-being of communities served by architectural practice.	X				
10	Collaborate effectively in interdisciplinary and intercultural teams, demonstrating leadership, communication, and project management competencies in design and professional contexts.	X				
11	Communicate architectural ideas persuasively and clearly in verbal, visual, and written form to professional, academic, client, and public audiences.		X			
12	Engage in continuous self-reflection, lifelong learning, and active contribution to the evolving architectural profession at local, regional, and international levels.			X		

ECTS / STUDENT WORKLOAD				
ACTIVITIES	**NUMBER**	**UNIT**	**HOUR**	**TOTAL (WORKLOAD)**
Course Teaching Hour (X weeks * total course hours)	15		3	45
Preliminary Preparation and self- study	15		2	30
Mid-Term	1		20	20
Quiz	-		-	-
Assignment	-		-	-
Project	-		-	-
Field Study	-		-	-
Presentation / Seminar	-		-	-
Studio Practice	-		-	-
Final Examination/ Final Project/ Dissertation	1		30	30
Other	-		-	-
TOTAL WORKLOAD				125
TOTAL WORKLOAD / 25				5
ECTS				**5**

RULES WITH REGARD TO THE COURSE

Plagiarism Disclaimer
Detected and undetected plagiarism is a serious offense at any time and can have devastating effects on your degree results and future professional life.
Plagiarism is easy to avoid if you ensure that you properly identify and acknowledge your sources and do not copy directly from visual examples, designs, or notes that have themselves been taken word-for-word from your sources.

	SDG 1: No Poverty	
	SDG 2: Zero Hunger	
	SDG 3: Good Health and Well-Being	
	SDG 4: Quality Education	X
	SDG 5: Gender Equality	
	SDG 6: Clean Water and Sanitation	
	SDG 7: Affordable and Clean Energy	
	SDG 8: Decent Work and Economic Growth	
	SDG 9: Industry, Innovation and Infrastructure	
	SDG 10: Reduced Inequalities	
	SDG 11: Sustainable Cities and Communities	
	SDG 12: Responsible Consumption and Production	
	SDG 13: Climate Action	
	SDG 14: Life Below Water	
	SDG 15: Life on Land	
	SDG 16:Peace, Justice and Strong Institutions	
	SDG 17:Partnership for the Goals	

ASSESSMENT DETAILS AND EVALUATION CRITERIA:
Final grades will be determined based on the course learning activities and the assessment details for the final examination or project, as outlined below, in accordance with the University's Education and Examination Regulations.
Students are required to attend at least 70% of the classes. The maximum allowable absenteeism is 30%.

Mid-Term (40%)
Early tasks/exercises related to:

1. Calculations
2. Algebra and equations
3. Geometry and trigonometry

Late work can only receive full credit in extreme circumstances and will be penalized otherwise as follows:

- Up to an hour late: 5% deducted
- Over an hour but less than a day late: 10% deducted
- Over a day but less than two days late: 15% deducted
- Over two days but less than a week late: 25% deducted
- A week or more late: Not accepted: 0%

Final (60%)
Formal written, timed exam: 1.5 hours

- Covering all aspects of the syllabus in the tables above

PREPARED BY	Vic Grout
UPDATED	20/09/2024
APPROVED	