

Program Records

About the Program	The Master Science of Sustainable Urban Infrastructure Engineering is an interdisciplinary program focusing on urban infrastructure engineering and sustainability. The objective of the program is to educate students with Master of Science Degree with having knowledge and skills to be able to create sustainable engineering solutions for the problems due to rapidly growing urban population in cities, tackling the problems from a different viewpoint of different disciplines and being research-oriented. The program is supported by faculty members of Civil Engineering, Computer Engineering, Industrial Engineering and Electrical and Electronics Engineering Departments.
Program Outcomes	<p>1.can work as a specialist, technical staff or manager in urban infrastructure engineering issues in national or international private and public sector organizations.</p> <p>2.can work in academic positions by continuing their doctoral studies in the field of urban infrastructure in the departments of national and international universities.</p> <p>3.take position as an innovative and research-oriented individuals, in national or international business and venture projects in the fields of urban infrastructure systems and their sustainability in order to contribute to society in line with national or global technological needs.</p>
Qualification Awarded	Master Degree
Length of Program & Credits	2 years 120 ECTS
Level of Qualification	Second Cycle (Master) Degree; EQF-LLL: 7. Level QF-EHEA:2. Cycle
Mode of Study	Full Time
Field of Study	Engineering, Manufacturing and Construction
Admission Requirements	An undergraduate diploma; a passing or acceptable score from the English Proficiency Exam of Abdullah Gül University, YDS (Foreign Language Exam), YÖKDİL (Foreign Language Exam for Higher Education Institutions), or TOEFL; an acceptable score from the Academic Personnel and Postgraduate Education Entrance Exam (ALES - Mathematical Score Type); a passing score at the oral interview for the concerned Master's program. International students are admitted based on the criteria posted by the university.
Recognition of Credit Mobility	<p>Course Substitution: For course substitutions, medium of instruction of a previous course must be English, its final grade must be at least 3.00 out of 4.00 and approval of a relevant University Board is required.</p> <p>Lateral Transfer: Spending at least one semester at the master's program currently enrolled in, taking at least 2 credit courses and passing them with at least 3.00 out of 4.00.</p>
Graduation Requirements & Regulations	Successful completion of 7 Courses, Seminar and Ethics; a minimum grade point average (GPA) of 3.00; earning 120 ECTS credits; successful submission of a thesis.
Occupational Profiles of Graduates	Graduates of AGÜ Graduate School of Engineering Science- Sustainable Urban Infrastructure Engineering M.Sc. Programs can be employed as a specialist, technical staff or manager in urban infrastructure engineering issues in national or international private and public sector organizations. In addition, graduates of this program can also have the opportunity to set up their own firms in the fields of urban infrastructure engineering or to pursue an academic career studying for a PhD degree.

Access to Further Studies Graduates may apply to third cycle (Level 8) degree programs.

Assessment & Grading Policy Based on Abdullah Gul University Undergraduate Education and Examination Regulation rules;

<u>Letter Grade</u>	<u>Coefficient</u>	<u>Score</u>	<u>Status</u>	<u>Letter Grade</u>	<u>Status</u>
A	4,00	90-100	Pass	NA	Not Attended
A-	3,67	87-89	Pass	W	Withdrawn
B+	3,33	83-86	Pass	I	Incomplete
B	3,00	80-82	Pass	T	Transferred
B-	2,67	77-79	Pass	S	Satisfactory
C+	2,33	73-76	Pass	U	Unsatisfactory
C	2,00	70-72	Pass	P	In Progress
C-	1,67	64-69	Conditional Pass	EX	Exempt
D+	1,33	56-63	Conditional Pass		
D	1,00	50-55	Conditional Pass		
F	0,00	0-49	Failed		

Program Outcomes	
PO1.	have advanced theoretical and practical knowledge in the field of sustainable urban infrastructure engineering.
PO2.	define the problems related to the sustainability of urban infrastructure components, evaluating the data, developing solutions based on research and experimental findings having the ability of making engineering designs.
PO3.	use the latest technology and innovative approaches effectively in the design and development of sustainable urban infrastructure systems.
PO4.	follow the scientific literature related to urban infrastructure systems and their sustainability and to have the ability to transfer these knowledge effectively in oral and written form.
PO5.	make interdisciplinary communication and to work efficiently in multidisciplinary teams.
PO6.	integrate knowledge from different disciplines in sustainability-oriented design in urban infrastructure systems, resource utilization, energy efficiency, waste management, risk assessment in urban infrastructure systems.
PO7.	classify the social, environmental and economic dimensions of sustainable urban infrastructure systems.
PO8.	adhere to the social, scientific and ethical values in their studies.

TQF-HE & Program Outcomes Coverage

	Knowledge Theoretical Conceptual	Skills Cognitive Practical	Competences				
			Work Independently and Take Responsibility		Learning	Communication and Social	Field Specific
PO1	X	X					
PO2	X	X	X		X	X	X
PO3	X	X	X		X	X	
PO4	X	X	X		X	X	X
PO5			X			X	X
PO6						X	X
PO7	X	X				X	X
PO8	X	X	X		X	X	X

Institutional & Program Outcomes Coverage

	IO1	IO2	IO3	IO4	IO5	IO6	IO7
PO1	X						X
PO2	X	X					

	PO3	X	X			
	PO4					X
	PO5			X	X	X
	PO6	X	X		X	
	PO7			X		X
	PO8			X		X

Curriculum

1. Semester

Code	Course	T	P	Credits	ECTS
SIE510	Sustainability in Urban Infrastructure	3	0	3	10
SIEXXX	Elective Courses	3	0	3	10
SIEXXX	Elective Courses	3	0	3	10
GCC1001	Introduction to Scientific Research	3	0	3	10
	Total	12	0	12	40

2. Semester

Code	Course	T	P	Credits	ECTS
SIEXXX	Elective Courses	3	0	3	10
SIEXXX	Elective Courses	3	0	3	10
SIEXXX	Elective Courses	3	0	3	10
SIEXXX	Elective Courses	3	0	3	10
SIE500	Seminar	0	2	0	4
	Total	12	2	12	44

3. Semester

Code	Course	T	P	Credits	ECTS
SIE599	MSc Thesis	0	1	0	25
SIE597	MSc Special Topics	4	0	0	5
	Total	4	1	0	30

4. Semester

Code	Course	T	P	Credits	ECTS
SIE599	MSc Thesis	0	1	0	25
SIE597	MSc Special Topics	4	0	0	5
	Total	4	1	0	30

Curriculum Summary

%		Courses	Credit	ECTS
7	YÖK/HEC Courses GCC1001	1	3	10
7	Compulsory XXX	1	3	10
41	Electives XXX	6	3	10
3	Seminar IE500	1	0	4
7	MSc Special Topics IE597	2	0	5
35	MSc Thesis IE599	2	0	25
100,0	TOTAL	13	21	144

Program Course Code Descriptions

SIE	A B C
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Digit	Explanation
A	A, which denotes the M.Sc Programme {5}
B	B, which denotes the field, is in {0, ..., 9}. See below
C	C is in {0, ..., 9}. Course order for each of field

Value for the digit B	Area
0	Basic
1	Compulsory Course
2	Hydraulics
3	Material Science
4	Biotechnology/Bioengineering
5	Geotechnics
6	Structural Engineering
7	Transportation
9	Special topics

Courses Descriptions

Code	SIE500
Name	M.Sc. Graduate Seminar
Hour per week	2 (0 + 2)
Credit	0
ECTS	4
Level/Year	Graduate
Semester	Fall and Spring
Type	Compulsory
Prerequisites	
Coordinator(s)	
Description:	It is compulsory to take the seminar course as a seminar course in any semester.

Code	SIE510
Name	Sustainability in Urban Infrastructure
Hour per week	3 (3 + 0)
Credit	3
ECTS	10
Level/Year	Graduate
Semester	Fall or Spring
Type	Compulsory
Prerequisites	
Coordinator(s)	
Description:	Ways of microorganisms utilization in urban infrastructure, biotechnology in sustainability, sustainability in geotechnical applications, land planning, utilization and urban design, sustainable urban transformation, sustainable use of all kinds of resources, transportation networks, evaluation of risky areas and structures in sustainable order, systems and technologies developed for sustainable structures, drinking water and wastewater treatment processes, sustainable building materials and life cycle analysis.

Code	SIE 520
Name	Sustainable Energy
Hour per week	3(3 + 0)
Credit	3
ECTS	10
Level/Year	Graduate
Semester	Fall or Spring
Type	Elective
Prerequisites	
Coordinator(s)	
Description:	In this course, local and global sustainable evaluations of existing and potential energy systems, resources and utilization technologies will be handled. Also the scientific principles and technologies related to harnessing and conversion of the earth's renewable energy sources will be discussed and combined with case studies. Specialists will be invited to the course on renewable energy applications. Students will be able to evaluate energy technology systems in terms of engineering, political, social, economic and environmental objectives.

Code	SIE521
Name	Clean Water Access Infrastructure in Developing Countries
Hour per week	3 (3 + 0)
Credit	3
ECTS	10
Level/Year	Graduate
Semester	Fall or Spring
Type	Elective
Prerequisites	
Coordinator(s)	
Description:	In this course, students will be provided with appropriate and sustainable focus on clean water access infrastructure planning in developing countries. The clean water problem will be examined from a multidisciplinary perspective. Students will be informed by examples of areas where access to clean water is limited, such as Asia, Africa and Latin America. At the end of the course, students will become competent in designing simple, sustainable water supply systems in the developing countries that suffer from water access difficulties.

Code	SIE522
Name	Environmental Resource Management with Pollution Prevention
Hour per week	3 (3 + 0)
Credit	3
ECTS	10
Level/Year	Graduate
Semester	Fall or Spring
Type	Elective
Prerequisites	
Coordinator(s)	
Description:	In this course, students will learn pollution prevention strategies which are the most important topics of sustainable development. They will have experience about greener designs to be able to take pollution precautions during production and construction for different sectors and applications. The course will be based on a multidisciplinary basis on the assessment of pollution prevention practices for the effective management of environmental resources.

Code	SIE530
Name	Eco-Efficient Concrete for Sustainable Infrastructure
Hour per week	3 (3 + 0)
Credit	3
ECTS	10
Level/Year	Graduate
Semester	Fall or Spring
Type	Elective
Prerequisites	
Coordinator(s)	
Description:	In this course, eco-efficient concrete mixtures, which are one of the important components of sustainable infrastructure, are addressed in a wide scope. The course consists of the following topics: Environmental impacts of Portland cement production, Life cycle analysis of concrete (LCA); Mineral admixtures and High-volume mineral admixtures concrete and their durability properties; Self-consolidating eco-efficient concrete; Concrete mixtures containing reactive and non-reactive waste; Innovative and sustainable binder types.

Code	SIE531
Name	Nanotechnology in Sustainable Construction Materials
Hour per week	3 (3 + 0)
Credit	3
ECTS	10
Level/Year	Graduate
Semester	Fall or Spring
Type	Elective
Prerequisites	
Coordinator(s)	
Description:	The course contain innovative approaches and applications that have emerged in recent years in the development of sustainable building materials includes following chapters; Nano-modification of cementitious materials; Use of carbon nanotubes and carbon nanofibers in cementitious materials; Use of nanoparticles in cementitious materials; Use of copper nanoparticles in steel; Silver nanoparticle containing coatings and paints.

Code	SIE532
Name	Special Cements
Hour per week	3 (3 + 0)
Credit	3
ECTS	10
Level/Year	Graduate
Semester	Fall or Spring
Type	Elective
Prerequisites	
Coordinator(s)	
Description:	The course contains the other types of cement out of which commonly used in the building sector and used in special cases and applications and their properties. The course includes the following topics: White Portland cement production and hydration chemistry. Calcium aluminate cement; production, content, hydration, mechanical properties and durability properties. Special Portland-type cements and their properties; belite cement, expanded cement, Portland polymer cements, ferrite cement, hydrophobic portland cements, geopolymers and geopolymer cements.

Code	SIE533
Name	Introduction to Building Information Modeling
Hour per week	3(3 + 0)
Credit	3
ECTS	10
Level/Year	Graduate
Semester	Fall or Spring
Type	Elective
Prerequisites	
Coordinator(s)	
Description:	This course aims to provide basic knowledge and basic practice on the fundamentals and applications of building information modeling (BIM) concepts. Within the scope of the course; BIM components, BIM's benefits, BIM design tools and parametric modeling, BIM platforms, sample BIM applications.

Code	SIE540
Name	Environmental Biotechnology
Hour per week	3 (3+0)
Credit	3
ECTS	10
Level/Year	Graduate
Semester	Fall or Spring
Type	Elective
Prerequisites	
Coordinator(s)	
Description:	Biological processes used in environmental engineering applications and future perspectives of these processes are investigated. The latest biotechnological approaches such as biological disposal of wastes, production of value-added products and energy from biological waste engineering of bacterial communities, and management of bacterial resources are discussed.

Code	SIE541
Name	Biodegradation and Biodiversity in Concrete Structures
Hour per week	3 (3 + 0)
Credit	3
ECTS	10
Level/Year	Graduate
Semester	Fall or Spring
Type	Elective
Prerequisites	
Coordinator(s)	
Description:	In the first part of the course, biological processes affecting concrete and stone structures and degradation mechanisms are emphasized. In the second chapter, the issues related to the improvement of building materials by using biological processes are discussed. Protection of the surfaces of historic buildings by biogenic applications, repair and rehabilitation of concrete structures by biogenic ways are discussed.

Code	SIE542
Name	Structure Biotechnology
Hour per week	3 (3 + 0)
Credit	3
ECTS	10
Level/Year	Graduate
Semester	Fall or Spring
Type	Elective
Prerequisites	
Coordinator(s)	
Description:	This course focuses on structure biotechnology, which is emerging as a new field, and discusses the use of microorganisms in the production of sustainable structure materials. Interaction of materials with Biopolymers and biofilms, structure materials obtained with the help of biogenic processes, soil and surface improvements, transformation of excavation wastes into valuable products are discussed.

Code	SIE543
Name	Introduction to Microorganism and Biofilm Physiology
Hour per week	3 (3+0)
Credit	3
ECTS	10
Level/Year	Graduate
Semester	Fall or Spring
Type	Elective
Prerequisites	
Coordinator(s)	
Description:	Students taking the course are informed about the physiology of microorganisms, physical and chemical interaction of bacterial cells with different surfaces, biofilm formation. After that, debates on the development of symbiotic biofilms and antimicrobial surfaces are carried out.

Code	SIE550
Name	Urban Geology
Hour per week	3 (3 + 0)
Credit	3
ECTS	10
Level/Year	Graduate
Semester	Fall or Spring
Type	Elective
Prerequisites	
Coordinator(s)	
Description:	In this course, the basic knowledge of geology and the effects of topography on the urban structure will be revealed also geological and geographic investigation methods of urban areas will be talked about.

Code	SIE551
Name	GIS Based City Information Systems
Hour per week	3 (3 + 0)
Credit	3
ECTS	10
Level/Year	Graduate
Semester	Fall or Spring
Type	Elective
Prerequisites	
Coordinator(s)	
Description:	In this course, the concepts of urban information system (KBS) will be investigated in detail. Municipal information systems, modeling in the city information system, technical and economic needs in place and reorganization activities in the city information system will be able to take place. The use and importance of geographic information system in urban planning will take place.

Code	SIE552
Name	Geotechnical Applications in Infrastructure
Hour per week	3 (3+0)
Credit	3
ECTS	10
Level/Year	Graduate
Semester	Fall or Spring
Type	Elective
Prerequisites	
Coordinator(s)	
Description:	Within the scope of Foundation design principles, the detailed design of the relevant projects related to Urban Infrastructure Engineering is included in the scope of this course. Giving detailed information about the projects related to Urban Infrastructure Engineering is take part of this course.

Code	SIE553
Name	Natural Disasters and Urbanization
Hour per week	3 (3 + 0)
Credit	3
ECTS	10
Level/Year	Graduate
Semester	Fall or Spring
Type	Elective
Prerequisites	
Coordinator(s)	
Description:	Due to the frequent occurrence of natural disasters, especially earthquakes in our country, natural disasters have become one of the main factors to be taken into consideration in urbanization and urban planning process. Therefore, taking into consideration of natural disasters risks in urbanization, the necessary points and remedial solutions for these disasters will be given in this course.

Code	SIE554
Name	Microzonation in Urban Design
Hour per week	3 (3 + 0)
Credit	3
ECTS	10
Level/Year	Graduate
Semester	Fall or Spring
Type	Elective
Prerequisites	
Coordinator(s)	
Description:	By using Microzonation survey studies and settlement conformity evaluations in preparation of hazard identification and risk reduction plans, reduction of disaster risks, ensuring reconstruction in accordance with the principles of modern urbanism and planning due to the distorted construction in our cities and the problems it creates are take place in this course.

Code	SIE555
Name	Soil Improvement in Urban Infrastructure Engineering
Hour per week	3 (3 + 0)
Credit	3
ECTS	10
Level/Year	Graduate
Semester	Fall or Spring
Type	Elective
Prerequisites	
Coordinator(s)	
Description:	In this course, different soil improvement methods such as preloading, deep compaction, vibroflotation, dynamic compaction, ground nailing, reinforced ground, stone and sand piles, geosynthetics, thermal methods, freezing and electro osmosis, anchors, superficial compaction, vibratory deep compression methods, reinforced soil, jet grout etc. such as different ground improvement issues will be discussed in detail.

Code	SIE560
Name	Earthquake Engineering
Hour per week	3 (3+0)
Credit	3
ECTS	10
Level/Year	Graduate
Semester	Fall or Spring
Type	Elective
Prerequisites	
Coordinator(s)	
Description:	This course includes fundamental knowledge of earthquake occurrence, vibration of structures under earthquake loading, standard regulations based on earthquake design, and push-over analysis for structures subjected to earthquake loading.

Code	SIE561
Name	Advanced Reinforced Concrete
Hour per week	3 (3 + 0)
Credit	3
ECTS	10
Level/Year	Graduate
Semester	Fall or Spring
Type	Elective
Prerequisites	
Coordinator(s)	
Description:	The main objective of this course is to examine the advanced design and behavior of reinforced concrete structures under various loads in a more extensive and detailed way. For this course, it is envisaged that students have already taken reinforced concrete design course in BS degree. Therefore, this course consists of bearing walls, shear walls, reinforced concrete design under torsional stresses, advanced reinforced concrete flooring design, and earthquake regulations for reinforced concrete structures.

Code	SIE562
Name	Advanced Steel Structures
Hour per week	3 (3+0)
Credit	3
ECTS	10
Level/Year	Graduate
Semester	Fall or Spring
Type	Elective
Prerequisites	
Coordinator(s)	
Description:	This course consists of design of steel plates, torsional member design, lateral and torsional buckling of beams, plastic analysis and plastic design of beams, the design of plate girders, braced and unbraced frames, and design of rigid frames.

Code	SIE563
Name	Finite Element Modeling for Structures
Hour per week	3 (3+0)
Credit	3
ECTS	10
Level/Year	Graduate
Semester	Fall or Spring
Type	Elective
Prerequisites	
Coordinator(s)	
Description:	Basic principles of finite element method, application of direct stiffness method to one dimensional problems, prismatic bars under axial loads, bending of beams, solution of two dimensional problems for planar structures, modeling and analysis of three dimensional solid materials and structures with finite element method in computers will be covered in this course.

Code	SIE564
Name	Retrofitting and Restoration for Sustainable Structures
Hour per week	3(3 + 0)
Credit	3
ECTS	10
Level/Year	Graduate
Semester	Fall or Spring
Type	Elective
Prerequisites	
Coordinator(s)	
Description:	This course consists of the fundamental knowledge of rehabilitation, retrofitting and restoration for sustainable structures, the evaluation of damages occurring in existing buildings and determination of reliability of these structures, recent techniques applied on rehabilitation and retrofitting, standards and regulations for the applications of rehabilitation and restoration of structures.

Code	SIE565
Name	Computational Analysis of Randomness in Structural Mechanics
Hour per week	3(3 + 0)
Credit	3
ECTS	10
Level/Year	Graduate
Semester	Fall or Spring
Type	Elective
Prerequisites	
Coordinator(s)	
Description:	This course consists of general randomness concepts in structural mechanics, the fundamental knowledge on probability theory and concepts of statistics, response surfaces and regression analysis, mechanical vibrations under random loading, different responses of different structures under random loading and calculation of probability of collapse of structures within the scope of this course.

Code	SIE566
Name	Fragility-Analysis Based Structural Reliability for Sustainable Structures
Hour per week	3(3 + 0)
Credit	3
ECTS	10
Level/Year	Graduate
Semester	Fall or Spring
Type	Elective
Prerequisites	
Coordinator(s)	
Description:	This course consists of the fundamental background about the structural design types defined in structural design codes, definition of ultimate limit state functions, determination of reliability of structures, push-over analysis, Monte-Carlo Simulation method, fragility analysis of structures which expose to random earthquake or wind loads to build sustainable structures.

Code	SIE567
Name	Structural Health Monitoring
Hour per week	3(3 + 0)
Credit	3
ECTS	10
Level/Year	Graduate
Semester	Fall or Spring
Type	Elective
Prerequisites	
Coordinator(s)	
Description:	This course consists of fundamental information in structural health monitoring (SHM), necessities of SHM systems for structures, fields of the applications of the SHM systems, data acquisition, non-destructive testing methods, design of measurement setups, analytical simulations within finite element methods, modal analysis, basic signal processing, feature extraction, data normalization, and damage detection.

Code	SIE570
Name	Sustainable Superstructure
Hour per week	3 (3 + 0)
Credit	3
ECTS	10
Level/Year	Graduate
Semester	Fall or Spring
Type	Elective
Prerequisites	
Coordinator(s)	
Description:	<p>This course consists of design, construction and maintenance of flexible (asphalt) and rigid (concrete) road superstructures within the framework of sustainability principles.</p> <p>Course content includes the concept of sustainability of the road superstructure, sustainable materials for the road superstructure, design and construction of sustainable road pavements, conservation-maintenance and rehabilitation applications, life cycle analysis of sustainable road pavements.</p>

Code	SIE597
Name	M.Sc. Special Topics
Hour per week	4 (4 + 0)
Credit	0
ECTS	5
Level/Year	Graduate
Semester	Fall and Spring
Type	Compulsory
Prerequisites	
Description:	M.Sc. Special Topics course is conducted and coded in accordance with the decision of the Institute Board.

Code	SIE 599
Name	M.Sc. Thesis
Hour per week	1 (0 + 1)
Credit	0
ECTS	25
Level/Year	Graduate
Semester	Fall and Spring
Type	Compulsory
Prerequisites	
Coordinator(s)	
Description:	This course will be taken by each student in the master's program and the result is evaluated by the supervisor as Successful / Unsuccessful.