

## **M.Sc. GRADUATE PROGRAM**

Graduate students must take 15-18 credits from compulsory courses, 6-9 credits from elective courses, 2 credit from seminar and 6 credits from thesis, overall 32 credits to receive M.Sc. degree.

### **Curriculum for the Degree of Master of Science in Civil Engineering, Major *Geotechnical Engineering***

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CREDITS</b>
<b>Semester I</b>		
1610500	Engineering Mathematics	3
1610502	Continuum Mechanics	3
1616551	Advanced Soil Mechanics	3
<b>Semester II</b>		
1616550	Soil and Foundation Dynamics	3
1616554	Advanced Foundation Engineering	3
<b>Elective Courses From</b>		
1610501	Advanced Engineering Geology	3
1610722	Soil Behavior Modelling	3
1616550	Soil and Foundation Dynamics	3
1616552	Theory of Plasticity in Soil	3
1616553	Rock Mechanics	3
1616555	Numerical Methods in Soil Mechanics	3
1616557	Earth Dams	3
1616708	Soil Rehabilitation	3
1616720	Seismic Geotechnics	3
<b>Semester III</b>		
16556	Seminar	2
16555	M.Sc. Project	6
<b>Semester IV</b>		
16555	M.Sc. Project (Continue)	0

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## **COURSE DESCRIPTION**

### **1610500 Engineering Mathematics**

3 Cr.

Review on Basic Mathematics, Special Functions, Calculus of Variations, Difference Equations, Vectors and Matrices, Fourier Analysis, Partial Differential Equations, Complex Analysis.

**Instructor:** Dr. Nasrin Jafari, Dr. Bashir Movahedian, Dr. Nima Noormohammadi

### **1610501 Advanced Engineering Geology**

3 Cr.

The geology of reservoir and dam sites, the geology of cuttings and tunnels, and site investigations.

**Instructor:** -

### **1610502 Continuum Mechanics**

3 Cr.

Basic concept, tensor algebra, tensor calculus, kinematics of deformation, the stress concept and the thermo-mechanical balance laws, selected topics in linear elasticity theory, selected topics in fluid mechanics, special theories of generalized continue.

**Instructor:** Prof. Mojtaba Azhari

**1610722 Soil Behavior Modelling**

3 Cr.

This course provides a background for development and application of soil models in such computer tools. This is done by focusing on soil behavior, elasto-plastic theory, some material models and their parameters. In addition the course aims at providing a theoretical framework for understanding the mechanical behavior of soils.

**Instructor:** Dr. Hamid Hashemolhoseini

**1616550 Soil and Fondation Dynamics**

3 Cr.

Vibration of single & multi degree freedom systems, fundamentals of soil mechanics, wave propagation & wave velocities, liquefaction phenomena, landslide phenomena, dynamic tests of soils, soil-structure interaction.

**Instructor:** Dr. Payam Asadi

**1616551 Advanced Soil Mechanics**

3 Cr.

This course is a continuation of the soil mechanics theories and the recent empirical formula for this subject.

**Instructor:** Dr. Hamid Hashemolhoseini, Dr. Hajar Shaar Isfahani

**1616552 Theory of Plasticity in Soil**

3 Cr.

This course should cover the main theories of materials plasticity, especially soils and the application of Mohr-coulomb, Von-Mises, and Tresca plasticity theories to the practical problems of soil mechanics and foundation engineering.

**Instructor:** -

**1616553 Rock Mechanics**

3 Cr.

This course should cover the principles of physico-mechanical properties of rocks as an eng. material. The main subjects in this course are: Physico-technical indices of rocks in both cases, i.e. samples and in situ, shear and tensile strength of rocks, rock structures; and rock technology.

**Instructor:** Dr. Hamid Hashemolhoseini, Dr. Mehdi Nasimifar

**1616554 Advanced Foundation Engineering**

3 Cr.

This course covers some advanced discussions about the slope stability, retaining structures, bearing capacity theories and underground structures.

**Instructor:** Dr. Mohammad Ali Roshanzamir, Dr. Mohamadreza Khanmohamadi

**1616555 Numerical Methods in Soil Mechanics**

3 Cr.

This course should cover the basic methods of approaching the solution of problems in soil mechanics and foundation engineering by the numerical methods such as the finite difference. The primary subjects which should be discussed by the numerical approach are: Settlement, consolidation, failure, seepage problems and the slope stability.

**Instructor:** Dr. Behrooz Koosha

**1616557 Earth Dams**

3 Cr.

Earth dam foundation and abutment preparation requirements, Design considerations, including freeboard, top width, abutments, earthquake effects and performance parameters, Methods of seepage control, Embankment materials, zoning, cracking and reinforcement, as well as compaction requirements

**Instructor:** Dr. Hajar Shaar Esfahani

**1616558 Marine Geotechnics**

3 Cr.

Marine soil investigations, skirted foundations, anchoring, piles, slope stability, cyclic loadings.

**Instructor:** Dr. Mohammad Ali Roshanzamir

**1616708 Soil Rehabilitation**

3 Cr.

an in-depth look at the principles of rehabilitating natural environments that have once been disturbed by developments such as surface mining, improper agricultural land management practices or any form of pollution.

**Instructor:** Dr. Mohammad Ali Roshanzamir

**1616720 Seismic Geotechnics**

3 Cr.

The focus of the course is on engineering assessment concepts and their application to seismic evaluation of land, buildings and infrastructure. These include evaluation of site response, retaining structures, foundations, soil-structure interaction and stability of slopes under earthquake loads.

**Instructor:** Dr. Hamid Hashemolhoseini