

MKAJ 1013 Advanced Soil Mechanics (3 credits)

This subject is one of the core subjects offered which provide the knowledge on the application and principles of soil mechanics. It considers the following topics: soil and clay mineralogy, strength behaviour of cohesionless and cohesive soils. Mohr-Coulomb failure criterion, peak stresses, effective stress ratio, residual stress and critical state soil mechanics. Principles of the laboratory measurement. Consolidation theory and pore pressure parameters. Difference between 1-D and 3-D Consolidation theory. Field Settlement. Soil-water characteristic curve for unsaturated soils and its applications.

MKAJ 1023 Advanced Geotechnical Analysis and Design (3 credits)

Design and construction of earthworks, such as embankment, cutting, dam, tunnel and earth retaining structures. Ground improvement techniques and practical solution to problems often confronted during construction in difficult ground area. Evaluation of construction and post-construction data for purposes of performance, safety and design compatibility. Design and stability analysis of slope and embankment.

MKAJ 1033 Advanced Foundation Engineering (3 credits)

Site Investigation Interpretation for design of foundation. Principles of foundation design, selection of foundation, bearing capacity and settlement problems. Various types of foundation and their criteria for selection will be presented which is interpreted from site investigation related for shallow foundation, pile, raft foundation, drilled shaft, cofferdam, underpinning, Group piles, laterally loaded and uplift piles. Settlement and bearing capacity considerations will be employed to select and design the appropriate foundation scheme for structures. The student will be able to understand and apply the principles of foundation design in terms of technical feasibility, economic viability, articulate and justify technical analyses through oral, written and graphical means.

MKAJ 1043 Geotechnical Modelling (3 credits)

Definition of physical and centrifuge modeling and application in geotechnical engineering practice. Theoretical modeling including Elastic stress distribution and Plastic failure analysis such as Bound theorems. Constitutive model used for Finite Element Method and other numerical modeling techniques. Basic properties of soil behaviour (based on constitutive relationship) such as elasticity, elasto-plasto, and plastic model are explored for the material characterization of the modeling process.

MKAJ 1073 Engineering Rock Mechanics (3 credits)

Focus is on principles of rock mechanics which are relevant to design and construction of rock engineering structures (slope, foundation and excavation in rock). Methods for measuring engineering properties of rock in lab and in situ, and understanding on how these rock properties (at material and mass scale) affect the deformational behavior rock mass when subjected to induced stresses (construction and geological). For rock engineering structures it is essential to appreciate how geological elements and processes affect rock behavior. Common methods for stabilizing rock engineering structures are also included.

MKAJ 1103 Engineering Geology and Environment (3 credits)

Engineering geology is concerned with the applications of the principles of geology to civil (and to some extent in mining) engineering. The content of this syllabus is tailored to enable students to acquire knowledge on the elements of engineering geology and subsequently able to apply essential principles of engineering geology in designing rock engineering structures or work with the geologic masses. The course take into account those geological aspects which control the economy and safety of the structure that required to design and construct.

MKAJ 1053 Software Application in Geotechnical Eng. (3 credits)

This course is designed to expose the students in analyzing geotechnical engineering problem using Plaxis 7.2 and Geo-Studio 2004 Products: SEEP/W, SIGMA/W and SLOPE/W. This course will illustrate what students can do with the modern software tools now available and highlight the important/benefits of numerical modeling. The series of example which taken from the existing literature are employed in this courses, intended to provide the students some example problems that they can use to develop their modeling skills. This course also exposes the knowledge on the usage some of the notation and basic input procedures that are used in the software effectively. At the end of the course, students should be able to utilize this software, improve modeling skills and give some new ideas on how to apply numerical models related to geotechnical engineering problems.

MKAJ 1063 Geotechnical Earthquake Engineering(3 credits)

Application of vibration and wave propagation theories to soil media, dynamic properties of soil and their determination, design procedures for foundation subjected to dynamic forces. Introduction to earthquake problems and seismic design of foundation.

MKAJ 1083 Environmental Geotechnics (3 credits)

Site investigation for contaminated soils, site selection for waste disposal, forms of geotechnical contaminations. Regulations governing waste disposal, geotechnical control and environmental protection. Landfill design, groundwater leachate and contamination control, treatment of contaminated soils.

MKAJ 1093 Unsaturated Soil Mechanics (3 credits)

This subject is one of the elective subjects offered by the Department of Geotechnics and Transportation, which will provide: the knowledge on the fundamental of unsaturated soil: properties, stress state variables. Measurements of suction. Seepage through unsaturated soils: steady state and unsteady state. Volume change and application: in-situ stress state, swelling pressures, heave predictions. Shear strengths and applications: compacted and residual soils, earth pressures, bearing capacity, slope stability.

MKAM 1033 - Construction Technology (3 credits)

Site inspection, investigation, clearance and preparation. Pile driving and construction methods. Construction production and control, IBS, bridge and high rise construction, other methods of construction.