

- Course Description

Elasticity Theory and Application
Deformational analysis, stress and strain tensor, compatibility, configuration method, destruction theory, asymmetrical bending, beam on elastic ground, experimental mechanics
Continuum Mechanics
Vector and tensor analysis, kinematics of continuum, stress, constitutive equation, linear elastomer, Incompressible fluid, linear viscous fluid
Theory of Elastic Stability
Bar framework, elastic buckling of the truss member, buckling analysis of as eigenvalue problem, energy principles for stability, approximate analyses, inelastic buckling of columns and beams, buckling of plate and arch
Plastic Theory
Concept of plasticity, criterion of fracture, plastic model , plastic analysis and design of structures
Fracture Mechanics
Types and features of fracture, Ideal fracture strength, stress concentration of the place where elastic crack occurred, Griffith theory, compliance, propagation speed of crack, stress field and stress extension factor of crack tip, fracture mechanics involved in plastic deformation
Finite Element Analysis
Problem formation of the strain system , numerical solution on linear equations, analysis of one-dimensional structural system , variation principle, displacement method, analysis of membrane, plate, shell using both stress method and combination method, analysis of buckling
Nonlinear Finite Element Method
Constitution of material and geometric nonlinear stiffness matrix, Total Lagrangian method, Undated Lagrangian method, Newton-Raphson method, Modified N-R method, Quasi-Newton method, truss, constitution of application program to a structure such as beam and shell
Advanced Numerical Analysis

Nonlinear equation, simultaneous equations, problem of matrix, numerical interpolation, regression analysis, numerical integration, differential equations, partial differential equations, general numerical analysis using Monte Carlo method

Advanced Bridge Engineering

Design theory of bridges based on the AASHTO specifications, reinforced concrete bridges, steel bridges, composite girder bridges, analysis and design of PC girder bridges

Advanced Structures Mechanics

Energy principle, nonlinear theory, stress analysis of three-dimensional frame structures, analysis of composite structures

Dynamics of Structures

Fundamental theory of dynamics, principle of Hamilton, variational method, Lagrange equation, differential and integral solutions to the vibration type frequency analysis, Rayleigh-Ritz method, Galerkin method, Collocation method, proportional damping, dynamic response analysis

Structures Management

Damage detecting methods of structure, management method of structure, evaluation of structure, evaluation of structures, repairing and strengthening method

Optimization of Structures

Basic principle of optimization, design concept, minimum cost design of columns and beams, optimal design of structural systems, research trend of optimal design, numerical and analytical optimum design

Behavior of Concrete Members

Compression, bending, shear, torsion of the short-term and long-term behavior of the concrete member element receives a load

Plasticity in Reinforced Concrete

Brittle fracture model of linear elastic, nonlinear model, failure criteria of concrete, full-plastic fracture model, limit analysis, elastic - curing - destruction model

Finite Element Analysis of Concrete

Criteria of concrete destruction, crack model, the material for the repeated load, modeling, troubleshooting of nonlinear analysis method

Designing of Prestressed Concrete Structures

Shear and torsion design, statically indeterminate prestressed concrete structures, compression and tensile prestressed member, two-way slab systems, connection of prestressed concrete member, prestressed concrete circular tank

Plastic Design of Structures

Definition of collapse, Rectangular grillage, collapse of simple rahmen, elasto-plastic analysis, minimum weight design for repeated loads, multi-story ramen, numerical analysis

Advanced Bridge Design

Method of bridge design based on AASHTO and AASHTO LRFD specifications, design load, reinforced concrete bridges, steel girder bridges, prestressed concrete girder bridges

System Reliability Analysis

Basic statistical concepts, element of reliability, Hasofer-Lind reliability index, Rackwitz-Fiessler reliability index, loads of structure, system reliability, specifications

Applied Statistics

Random variables, probability distribution, The expected value, Estimates, Calibration of probability distribution, Simple regression analysis, Multiple regression analysis

Open Channel Hydraulics

Basic principles of Fluid Flow, Energy and Momentum Principles, Flow resistance, Computation of Non-uniform flow, Flood routing, Sediment transport, similarity law and model.

Computational Hydraulics

Characteristics of the fluid, Basic principles of fluid flow, Pipe network, Open channel flow, Potential flow, Equation of Navier- stokes, Basic Condition, Boundary condition, Matrix computations, Finite Difference Method, Finite element method.

Urban Hydrology

Summary of Urban Hydrology and rain management, Design rainfall of urban, Ross rainfall, Urban runoff process, Water quality of Urban runoff,

Data collection and analysis, Summary of urban hydrological modeling, Urban hydrological modeling

application.

Hydrologic Modelling Technique

Definition, Classification, Use in hydrologic Modelling, Synthesis system event in single hydrologic variable- single or multi-point, year · month · day data, Synthesis system event in multi-hydrologic variable - Thomas & Fiering model, Matalas model, FGN model, Forecast of monthly Hydrologic Data, Estimates of the probability of flood,

Stochastic Process

Poisson course, Renewal theory, Markov concatenation, Brownian motion and other, Markov course, Random Walk course

Time Series Analysis and Application

The seasonal decomposition-secular trend, Seasonal fluctuations, cycle of fluctuation , chance variation, System modeling using time series analysis, An analysis and prediction on stability of the system using time series model, Time series modeling of nonstationary, Time Series models for single and multiple-input multiple-output system

Sedimentology

Concepts and History of Sediment, Review of Fluid Mechanics, Velocity distribution, The physical properties of the sediment, Precipitation characteristics, Flow resistance, Safe waterways, Bed Forms, Movement of bed material, Change in the bed elevation of the alluvial channel, Similar movement in the channel.

Water Resources Planning

Technical and economical basic concept in water resources planning, Calculation of population and water demand, Initial analysis of water resources planning, The regional comprehensive plan, Public character of water resources planning, Economic and financial analysis, Risk and uncertainty analysis, Hydrological development model, Multi-objective optimization technique, Environmental and social impact assessment.

River Basin Management

Basin classification, Basin management guidelines, Reservoir management, Flood management, Management of environment and water quality, Reality of river management, Integrated river basin management.

Special Topics in Water Engineering

New challenges related to hydraulics and hydrology - Water resources engineering, Energy development, Planning, Design, Construction and Maintenance of technology, Analysis techniques. Prediction and protection technology of environmental change.

Urban Drainage System
Characteristics of urban rainfall and runoff, Retarding basin, Drainage pump station, River channel maintenance, Maintenance of flood plain and Channel, Advanced urban Hydrologic models, Flood protection measures in structure or non-structure.
Water Quality Modeling Technique
Measuring and recording water quality data, Interaction between the data collection and water quality modeling, Importance of measuring water velocity, Sampling, Water quality assessment, Water quality modeling, Modeling for management of water quality, Modeling for water quality management of water waste.
Contaminant Transport In Groundwater
Groundwater theory, Cause and effect of pollutants, Numerical simulation experiment of the movement of groundwater pollutants, Monitoring of the landfill, case study
Applied Hydrology
Analysis and measurement of rainfall, Evaporation and transpiration, Infiltration and percolation, Relationship of surface runoff and groundwater, Calculating effective rainfall, Unit hydrograph, Flood routing, Runoff model.
Advanced Surveying Engineering
The course covers introductions of geospatial analysis, underground surveying, oceanographic survey, astronomical surveying, satellite surveying, 3D surveying, inertial survey, facility and architectural surveying, construction plan, environmental resource analysis, etc.
Advanced Geodesy
The course discusses on the characteristics of the Earth and ellipsoids, shape of the Earth, time (solar, local, and world), measurements of gravity and earth magnetic fields, ocean current and its analysis, earth tide and analysis, earth crust movement, ground displacement, polar shift and earth rotation, earth crust balance, geothermal energy, etc.
Analysis of Observed Values
Least squares method, basic probability theory, statistical errors of interpretation and black, observations, and the linearized error propagation, regression and analysis of variance, and numerical methods for nonlinear equations, error ellipses and confidence ellipses, severity rate, DOE
Positioning System with Satellites
The course covers GPS surveying system, signal structure, pseudo-range measurements, return signal, phase measurement, orbit determination, coordinate systems, static and dynamic survey, mathematical theory of GPS, geometry and accuracy of GPS, displacement and error, applications of GPS, etc.

Deformation Monitoring Surveying

The course covers monitoring network design and adjustment methods, geodetic displacement monitoring, displacement monitoring with photogrammetric surveying and 현, geometrical analysis of displacement measurement, physical analysis, etc.

Close-Range Photogrammetry

The course covers image data acquisition system, data processing system, approaches on applications of adjustment photogrammetry, photogrammetry for industry, digital photogrammetry, submarine photogrammetry, etc.

Sea Surveying

The course covers positioning on the ocean using optical and electromagnetic wave sensors, bathymetry with sonar, characteristics of ocean flow, ocean tide, wave observation, positioning and displacement measurements for structures in the ocean.

Digital Mapping Systems

The course covers to produce a map features of numerical maps from numerical spatial data, application areas, principles of numerical mapping, data acquisition methods, numerical map production by scanning the existing map, aerial Photography, numerical map production using ground photo, numerical mapping using landsat images, automation of physical map using matching techniques of stereoscopic image, work process of numerical map production by the ground survey data.

Advanced Remote Sensing

The course covers remote sensing account, remote sensing principle, electromagnetic radiation characteristics, remote sensing equipment, detector, characteristics a probe, effects of atmospheric scattering, image transmission, image processing, image analysis and output, photo imaging, infrared imaging, radar images, application of remote sensing, satellite plan.

Advanced Facility Surveying

The course covers roads, railways , bridges, tunnels , mines, linear measurement for the construction of linear material surveying,
River engineering, erosion control works, water and sewage, dams, ports, for irrigation drainage handicraft surveying, facilities strain surveying, building surveying, surveying cultural property, airfield survey, reclaimed land surveying, golf course surveying such as methodology.

Advanced Satellite Image Processing

The course covers spectrum reflection observation of the atmosphere, emission and reflection characteristics of the object, modify and highlight video, numerical processing of the image about the resources and environment, video transmission, A/D and D/A Change, infrared, thermal infrared, radar, processing and output of multi-wavelength images.

Cartography

The course covers geodetic basis, map projections, coordinate systems, data models and digital map information, map digitizing, digital database, map database, the use of map information, computerized maps, map design, map compilation of deals with the theory.

Advanced Soil Mechanics

The soil stress at failure, plastic equilibrium state at semi-finite body arching effect of soil. Soil pressure acting on reinforced wall. Bearing capacity of soil.

Theoretical Soil Mechanics

Stress-strain relationship of soil by FDE, FEM. Analysis of seepage and consolidation. Theory of shear strength.

Soil Dynamics

Foundation design of machinery equipment. Earthquake effect to structure and earth dam. Stress-strain relationship of soil by dynamic loading. Wave propagation theory.

Soil Stabilization

Stabilization treatment, compaction, adjustment of soil material. Construction, stabilization of deep soil. Stabilization of weak soil.

Mechanical Tests of Soils

Field measurements, experimental methods in the laboratory, the interpretation of experimental results and cleanup methods

Rock Mechanics

This class treats the mechanical properties of rock strength. After studying the deformation problems of 3-dimensional elasticity and plasticity, stereo-net is studied to analyze the rock slope behaviors. Furthermore, ideal body theory is used to study the mathematical models of rock deformations.

Advanced Engineering Geology

Tests of laboratory and field to check the properties of rock and soil, for structure foundation, land slide, dam and dam sites, road and tunnel, earthquake and ground water. Aggregates and clay for construction material.

Special Topics in Geotechnical Engineering

Case study oriented to theory, design and analysis for geotechnical engineering.

Earth Reinforced

As an alternative treatment method for slope stability and principles learned the mechanical behavior of soil reinforcement and deals with the characteristics of the methods applied

Monitoring in Geotechnical Engineering

Implementation of new laws and instruments Monitoring Methods and theories learned in real time

Tunnel Engineering

General items and gunpowder for tunnel excavation. Tunnel section design calculation of reinforcing materials. Stress analysis. Safety analysis of tunnel. Monitoring of tunnel.

Applied Hydraulics

Sediment settling, transport and deposition by water, Weir and water gate, Water hammer and surge tank, Problem of river and groundwater, Problem of water and sewage, Problem of road and airfield and dam, Problem of coastal harbor.

Land Information Management

New understanding of land information in the information society, Land information system(LIS), Issues related to the implementation and development of LIS, cadastral information system, Digital Cadastral DataBase

Digital Photogrammetry

The course covers the basic process and the main process of numerical photogrammetry, numerical image acquisition methods and systems, error correction theory and application, image quality assessment, image processing techniques, numerica elevation model (DEM) extract, produce orthophotograph, GPS aerial triangulation, small format aerial photogrammetry, photo by the camera for non-measurement survey , video photogrammetry, the application of computer vision in digital photogrammetry, high-resolution satellite photogrammetry.

Fundamentals of Geographic Information System

The course covers component of the GIS, expression of the map data, the concept of a geographical database, data input and output, database construction and management, image processing, analysis, Application of plan.

Enviro-Geotechnical Engineering

Design of landfill site. Recovery of wasted soil. Behavior of ground water.
Slope Stabilization
Design and analysis of slope application of computer program, property and installation of reinforcing materials, properties of rock and soil slope.
Design and Analysis of Retaining Wall
Wall design and analysis by Rakine and Coulomb methods design of gravity wall and cantilever wall, design of reinforcing wall.
Advanced Design of Steel Structures
Loads of civil engineering structures, load factor design and allowable stress design, provisions of the specifications, fracture of steel, fatigue and local buckling, design of the extruded member, member design for composite loads, design of frame structures, design of steel bridge
Earthquake Resistant Design
Design of structures subjected to seismic loads and other dynamic load, sensitivity of theory for vibration of earthquake, setting of response spectra in specifications and elastic and non-elastic region, regional degree of safety analysis, setting according to the form of the structure, material and non-structural elements, prior design method
Advanced Design of Concrete Structures
RC and PC architecture design trends, design of statically indeterminate structure, bridge, building, packaging, cylindrical aquarium design, structural design of undergoing a combination stress
Advanced Material of Concrete
Type and characterization of construction material over civil engineering general, cement, understanding of each material characteristics and physical properties such as aggregate, understanding of mechanical properties and performance of the constituents between materials
Flood Design
Frequency analysis of hydrologic data, Rainfall analysis, Analysis of hydrograph, Rainfall-runoff relationship, Flood frequency analysis, Design flood flow of ungauged small and medium-sized basin, Storage and flood routing, Loss rate, Basin characteristics, Unit graph theory, Rainfall- runoff routing model, PMP, PMF.
Hydraulics for Water Quality
Conceptof hydraulic water quality, Physical properties and water quality of water, Water quality index, Basic expression of water quality variation - The equation of motion, Continuity equation, Water quality equation, Heat

equation, Diffusion equation, Transport of materials– Self purification capacity in river, lake, tidal river, coastal and flowing water.

Spectrum Analysis

Expression and spectrum of random variation, Autocorrelation function, Cross correlation function, Periodogram, Spectrum window, Autoregressive model method, Moving average model method, Autoregressive moving average model method, Data processing method, Analysis of simulation.

Design of Water Supply System

Water supply master plan, Design of Water Supply System, Theory of water treatment process, Water intake and conveyance water facilities, Screening, Setting basin, Mixing basin, Flocculation basin, Sedimentation basin, filter basin, Disinfection and Sterilization, A pure water reservoir, Water supply and drainage, Reservoir, Pressurized facilities, Analysis of the water distribution network, Water pipe construction and maintenance, Trenchless repair method, Water-related environmental technologies

Design of Sewer System

Sewer Master Plan, Design of Sewer System, Design flow, Theory of Sewage disposal, Pipe hydraulics, Detention pond and drainage pumping stations, Detention Facilities, Infiltration facilities, Sewer construction and maintenance, Trenchless repair method, Sewer-related environmental technologies

Special Topics in Water Supply and Sewer Engineering

New challenges related to Engineering of Water Supply and Sewerage - New technology of Water and Sewerage sector, Planning of water and sewerage sector, Design, Construction and Maintenance Technology, Prediction and protection technology of environmental change

Disaster Prevention of Typhoon and Floods

Natural Disasters, Hydrometeorology, Global warming, El Nino and La Niña, Typhoon disaster, Flood disaster, Drought disaster, Storm and flood damage reduction master plan, Criteria Rainfall-runoff reduction facilities, Disaster risk district designation and management, Storm and flood damage measures in Korea

Introduction to Safety Management for Disaster Prevention

Definition and necessity of Prevention disaster safety management, Recognition problems of Disaster and eventuation, Classification of disaster, Natural disasters, Facilities disasters, Social disaster, Accidents(Industrial) disasters, Laws and regulations, Various factors disaster and damage destination, Prevention of various disasters and recovery measures

Special Topics on Foundation Engineering

Shallow foundation and the errors that can occur during deep foundation design, foundation pile driving and troubleshooting of the soil generated during boring process, errors that can occur when calculating bearing capacity of the foundation, the basis and foundation of mutual behavior analysis methods and errors

Foundation Analysis by Geotechnical Materials

Material property and behavior analysis for geotechnical engineering ; soil, concrete, steel, interaction analysis and design for deep foundation and shallow foundation installed in soil ; foundation made of steel, concrete.

Introduction to Ubiquitous City

Definitions and concepts of U-City, Case of U-City ISP, U-Eco City's infrastructure design techniques, U- Smart Highway, U- bridges, U- port, U- disaster, U-Eco Home Eco-friendly state-of-the-art residential ecology space, covers the main content of the Act on the construction of a ubiquitous city, such as U-City-based technologies and utilization technologies related notice in terms of civil engineering

Linear Algebra with Computer

The ability to improve the actual calculation with the computer (Matlab) deals with the theory of matrix theory to the development of the most popular computer focused on the room for the purpose of application in a modern society.

Data Structure

Structure of the spatial information has the number of data types, such as points, lines, surfaces, text. These data within computers learn about the structure and process of the data appears as spatial information through any processing operation .

Master Paper Research Work

Doctor Paper Research Work(1)

Doctor Paper Research Work(2)