

**ASPETE
DEPARTMENT OF CIVIL & STRUCTURAL ENGINEERING
EDUCATORS**

4-Year Degree Programme

**Duration of Studies: 8 Academic Semesters
ECTS: 240**

Course Content

Μετάφραση από την Ελληνική:

Μαρία Μ. Καντωνίδου, Επικ. Καθηγήτρια, Υπεύθυνη Γραφείου Δημοσίων & Διεθνών Σχέσεων ΑΣΠΑΙΤΕ, σε συνεργασία με τους Καθηγητές Ειδικότητας.

Επιμέλεια Μετάφρασης:

Παναγιώτης Πελέκης, Αναπλ. Καθηγητής, Τμήμα Εκπ/κών Πολ. Δομ. Έργων.

Απόφαση Συμβουλίου Τμήματος: 11/18.05.2010

1st SEMESTER

D101 – Mathematics I (ECTS 6.0)

Linear algebra: matrices, determinants, linear systems, eigenvalues and eigenvectors. Vector calculus and analytic geometry. Differential and integral calculus of one variable. Sequences-Series: basic concepts, numerical series, function series, power series (Taylor and Maclaurin series). Ordinary differential equations. Applications in the field.

D102 – Physics I (ECTS 5.0)

Motion: Newton’s laws of motion, force and conservation of momentum, force and conservation of energy. Rotational force: description, rotational kinetic energy, inertia torque, parallel and perpendicular axis theorems, ροπή δύναμης and Newton’s second law, torque and conservation of energy, torque and conservation of angular momentum.

Fluid mechanics: basic concepts (pressure, buoyancy, Pascal’s principle), laws of continuity, Bernoulli’s law, viscosity, Stokes’s and Poiseuille’s laws. Heat: temperature scales, thermal expansion, calorimetry, phase changes, heat transfer. Thermodynamics: First law of thermodynamics, gas changes, second law of thermodynamics, heating and cooling machines, – Carnot cycle, third law of thermodynamics, entropy. Applications in the field.

Lab assignments: Theory of errors and error diagrams. Measuring angles and lengths. Young’s modulus of elasticity. Measuring the moment of inertia and angular acceleration. Measuring the moment of inertia and angular acceleration. Conservation of energy tests. The Maxwell wheel. Fluid density. Measuring the viscosity coefficient. Determining surface tension using the ring method. Determining the performance coefficient of a heater. Black body radiation. The Cp/Cv ratio.

D103 – Architectural & Technical Drawing (ECTS 4.0)

Line drawing. Decorative drawing—straight and curved lines. Straight and curved line joints. Geometric constructions. Elements of descriptive geometry. Drawing scales. Plans, views, and cross-sections of solid objects. Dimensioning. Axonometric drawings of solid objects. Building plans, views and cross-sections. Axisymmetric and perspective building drawings. Interior decoration and furnishing. Surrounding space and public space issues. Staircases. Symbols and legend of construction materials. Construction details. Special construction drawings.

Lab assignments.

D104 – Introduction to Informatics and Computer Programming (ECTS 5.0)

Number systems: binary, octal, hexadecimal. Hardware: input– output units, memory, cards. Software: system software, applications software. Networks–communications: computer communications, network architecture, internet (TCP/IP protocol, domain addresses, internet services).

Introduction to QBASIC programming language: input-output commands, program flow control, do loops, matrices.

Lab assignments: Introduction to Windows, Microsoft Word, Microsoft Excel. Internet, spreadsheets, email. Simple input-output and do loops (IF...THEN...ELSE and CASE, FOR, WHILE, REPEAT...UNTIL). One- and two- dimensional matrices.

D105 – Introduction to Educational Sciences (ECTS 4.0)

Theoretical background. Interdisciplinary aspects and approaches. Sources of pedagogical knowledge: educational practice, philosophical thinking, bibliographic support, scientific research. Determining factors in educational processes. General aspects of education: goals and objectives, school space and time, relations of school, family and society, etc.

Educational practice: fundamental principles, educational relations, school textbooks, educational material. New trends and forms of education: education for persons with special needs, environmental education, cross-cultural/intercultural education, health education – consumer education, art education, etc. Current pedagogical trends and applications: Children’s rights, voluntary work and social problematics, linking education and work, technological literacy, “flexible zone” in education, etc.

D106 – General and Developmental Psychology (ECTS 6.0)

Psychology as science. Methods of psychological research. Main theoretical streams. Personality – The role of heredity and environment. Adjustment (problems, disorders, defense mechanisms, etc). Intelligence, emotional intelligence, creativity.

Personal growth and development. Theories of human development (psychodynamics, sociological, and developmental approaches). Lifespan development. Special attributes at different stages. Focus on the emotional problems of adolescents (emotional disorders, depression and suicide, etc). Individual differences.

2nd SEMESTER

D201 – Mathematics II (ECTS 5.0)

Functions of multiple variables. Differential equations, the Laplace transform. Probability and statistics. Probability theory. Presentation of numerical data. Basics of distribution theory. Probability distributions: binomial, normal, student. Vector analysis. Applications in the field.

Lab assignments: Numerical calculations, mathematical expressions. Functions of one variable: limits, derivatives, integrals, graphs. Taylor series. Graph display of implicit, parameter, and reverse function. Solutions of equations, inequalities, and systems of equations and inequalities. Functions of multiple variables: limits, partial derivatives, differential, composite functions, graphs. Local maxima and minima, line integral, graphs. Solutions of differential equations and systems. Direction fields and graphs. Matrices and systems, eigenvalues-eigenvectors. Point lists, regression, graphs. Statistical analysis of data.

D202 – Physics II (ECTS 5.0)

Oscillations: linear harmonic oscillation, angular, damped, forced, resonance, composition. Waves: harmonic wave equation, wave intensity, superposition of waves, standing waves. Acoustics: subjective and objective characteristics of sound, noise measurement (decibel scale) – the Doppler phenomenon, ultrasounds. Electromagnetism: electrostatic field (Gauss law), magnetic field (Biot Savart's law, Ampere's law), electromagnetic induction (Faraday's law), Maxwell's equations.

Lab assignments: Light wavelength. Laser wavelength. Spectroscopy grading. Capacitance measurement. Resistance and capacitance measurement with a Wheatstone bridge. Thermal dependence of resistance. Voltage divider. Cathode-ray oscilloscope. Characteristic curve of PN junction diode. Special charge measurement. Hysteresis loop. X-ray attenuation coefficient.

D203 – Applied Mechanics (ECTS 5.0)

Elements of vector algebra. Definition of force and moment vectors. Basic principles of statics. Equipollent sets of forces; reduction of sets of forces. Distributed force sets; center of mass; centroid. Conditions of static equilibrium of rigid (undeformable) bodies. Statically determinate and indeterminate structures. Analysis of statically determinate trusses and beams. Determination of bending moment, shear force and axial force diagrams.

D204 – Engineering Geology (ECTS 5.0)

Basics of Engineering Geology. Geological formations. Identification and classification of rocks and minerals. The structure of the Earth. Crust, mantle and core. Basics of rocks. Igneous, sedimentary and metamorphic rocks. Stromatography. Use of geological compass. Use of measurement data. Network representations. Endogenous and exogenous geological processes. Erosion – surface erosion. Geomorphology. Slopes. Hydrographic network. Water divides. Catchment basins. Rivers. Geomorphology parameters. Geofoms and masonry. Representations of geological formations with traditional and modern methods. Physical properties of rocks. Fine scale and large scale rock properties. Description and measurements of discontinuities. Orientation of discontinuities. The Schmidt stereographic representation. Earthquakes, types of earthquakes, seismic waves. P and S waves. Underground waters. Permeability. The Dupuit assumption. Permeability, conductivity, and storativity tests. Geotechnical research projects. Research drilling, types of drilling, sampling.

Lab assignments: Minerals (mineral identification, the Mohs scale of hardness). Identification of rocks. Topographic and geological maps. Mapping of inclined soil formations in vertical sections, vertical fracture. Geological compass. Statistic analysis of geological data. Soil relief, hydrological basins, rock permeability. Seismology.

D205 – Philosophy – Sociology of Education (ECTS 5.0)

Philosophy of education: Fundamental concepts. Relationship of philosophy of education and education. Basic methods of philosophical analysis, philosophy of education and teacher education, the philosophical underpinnings of teaching and learning. Problems and antinomies in education, language

and philosophical thought, critical thought and philosophy. Major figures in the philosophy of education. Analysis of classical texts. Main philosophical streams. Trends and contemporary issues. Introduction to Sociology. Leading figures in sociology. Sociology of Education, overview of theoretical streams. Social functions of education, education and economic development, equal opportunities in education, school and social environment, school performance, school failure. The school as a social organization. Ideological-political functions of education. Sociological analysis of Greek educational system.

D206 – Educational Psychology (ECTS 5.0)

Introduction to educational psychology.

Learning: Concept, object and problems. Learning theories. Overview of main theories. Factors influencing learning outcomes (motivation, maturity, teaching styles, etc). Individual differences and learning. Learning styles and study habits. Perception, learning and memory.

Learning difficulties. Interpersonal relationships and mental health. Social skills. Enhancement of interpersonal relationships. Gender relations. Special student groups (intelligent students, mentally retarded, non-privileged students, foreign students, etc). The classroom as group. Peer groups in the classroom. Group types, group function and group dynamics. Drug, alcohol, AIDS and other support services for students and school. The teacher as counsellor.

3rd SEMESTER

D301 – Structural Material Technology (ECTS 7.0)

Types of structural materials. Structural materials chemistry. Properties of structural materials: porosity, moisture content, water absorption, water permeability. Laboratory test procedures. Aggregates and sieve analysis. Cement: properties and production technologies. Ceramics: properties and production technologies. Mortars and concretes: production, properties and testing. Structural timber: by-products and derivatives. Metals: ferrous and non-ferrous metals. Polymeric plastic materials. Polymeric structural materials. Structural glass and applications. Protection against corrosion. Asphalt materials. Asphalt mixtures. Bitumen. Insulations. Thermal, sound and radiation insulation. Insulating materials.

Lab assignments: Aggregate sampling and grading. Natural aggregate properties: apparent weight, specific gravity, porosity, mass coefficient, moisture content and water absorption. Specific gravity and water absorption of coarse-grain aggregates. Aggregate strength tests: Los Angeles wearing test. Friction and wearing test by Bohme. Sand equivalent test. Hydraulic conductivity test. Determination of fines. Metal hardness tests. Grain size analysis tests, Durability Tests and Compaction Tests of aggregates. Concrete strength tests. Concrete slump test, flowability of mortars.

D302 – Mechanics of Materials (ECTS 7.0)

Stresses and deformations. Stress condition. Failure criteria. Moments of Inertia. Fatigue: tension, compression, eccentric loading, shear, bending, torsion, buckling, creep. Combined loading. Deflection curve.

Lab assignments: Tension, Compression, Modulus of elasticity (E) and Poisson’s ratio. Shear, torsion, fatigue, folding and impact tests. Critical speed. Bending. Photoelasticity. Seismic fatigue evaluation. Hardness tests. Non-destructive methods.

D303 – Foreign Language-ESP (ECTS 4.0)

A learner-centered approach to English for Specific Purposes (ESP) in the context of civil & construction engineering curriculum. Task-based activities promoting the acquisition of receptive competence and communicative skills in the field (contextualized treatment of specific notions, functions, discourse skills and rhetorical components; specialized/authentic reference materials).

D304 – Computer-Aided Design (ECTS 2.0)

Creating, saving, and transferring design files. Draw commands (Line, Pline, Circle, Arc, Ellipse, etc). Edit commands (Erase, Copy, Move, Trim, Offset, etc). Drawing aids (Grid, Snap, Ortho, Drafting Setting, Osnap, etc). Text processing and editing (Text, Mtext). Automatic dimensioning. Editing of complex designs (Layer, Block, Xref). Scale printing.

D305 – Educational Management and Policy (ECTS 5.0)

Basic concepts and principles of educational management and policy. Statutes and Constitution. The issue of pedagogical freedom. Authority and pressure groups and their impact on educational policy. Organizational and management theories and their impact on educational management.

Structure and organization of the educational system: Overview of educational reforms and changes, levels of education, school types, institutions, etc). Central and regional educational management. School environment and school climate.

Human resource management. Staff categories. Staff management (placement, promotion and professional development policies). Human resource management in education. Gender and educational management. School quality and health and safety policy. The teacher as educator; the teacher as public servant or private employee. Performance assessment. Internal evaluation of school unit.

Comparative educational management and policy: European and international educational policy. CEDEFOP's role in Vocational Education and Training.

D306 – Counselling Psychology and Guidance (ECTS 5.0)

Counselling: Concept, aim, content, and relation with counselling psychology. Theoretical background, methodology and applications. Counselling intervention. Professional ethics and principles of counselling and guidance. Assessment in counselling. School case studies requiring counselling intervention and support.

Career counselling: School, educational and occupational guidance. Career development and personal growth. Career education in the context of career counselling. Career counselling methodology and organization of overall counselling/guidance services and interventions. Assessment in career counselling and guidance. Overall evaluation of career counselling and guidance.

4th SEMESTER

D401 – Structural Analysis I (ECTS 7.0)

Load bearing structures. Types of supports. Types of loads. Equilibrium equations. Single and multi degree of freedom structures. Stress condition of beams. Trusses and cabled structures. Multi span beams. Complex structures. Deformations Analysis. Influence lines of simply supported beams, Gerber beams, and three-hinged arches.

D402 – Building Constructions (ECTS 5.0)

Excavations. Load bearing structures. Indoor and outdoor walls. Roofing. Coating works. Marble works. Floors. Staircases. Door and window panels. Roof trusses. Railings. Painting works.

Lab assignments: Form-work. Wall construction. Floor construction. Wall and roof lining. Door and window panels. Railings and expansion joints.

D403 – Transportation Works (ECTS 5.0)

Introduction. Traffic and road characteristics. Highway design and standards - grade line, vertical curve, stopping and passing sight, cross section, etc. Grading operations - excavation and embankment, Bruckner Diagram. Soils and materials – aggregates, cements bituminous materials. Tests for aggregates and bituminous materials. Roadbed construction - grading and construction operations. Base courses - granular and treated base courses. Bituminous pavements - design methods and procedures. Highway maintenance and rehabilitation.

Lab assignments: Road design. Speed determination. Grade line and vertical curve design. Stopping and passing sight in grade line and over crests. Cross section design using tables or computer software. Grading operations: area and volume measurements, earth diagrams, Bruckner diagrams. Road pavement design. Asphalt tests. Bituminous tests. Initial construction cost calculation.

D404 – Construction Management and Machinery (ECTS 4.0)

Technical works: procedures and legislation. Construction site planning and operation. Construction site works. Preliminary works: excavations, embankments, scaffolding, demolitions. Positioning of buildings. Piles. Tunneling, underwater works, etc. Construction management and organization, construction site decisions, material quantities (estimates, measurements, budget, invoicing). Safety and hygiene precautions. Necessary facilities and equipment. Laws and regulations. Common accidents. Scheduling of construction activities. Plan lay-out and work flow. Construction progress diagram. Construction cost. Time-cost curves. Mechanization of technical works. Mechanical equipment,

machinery types and appropriate selection.

D405– Teaching Methodology (ECTS 7.0)

Introduction to the field. Teaching models. Forms and principles of teaching. New ways of teaching, teaching style(s), dilemmas in teaching, curriculum and hidden curriculum. Lesson planning, goals, content, and implementation. Teaching methods: Lecture, guided discussion, Socratic questioning, demonstration, discovery learning, cooperative learning, team teaching, individualized teaching, project-based, problem-based, skill-based, interdisciplinary instruction, developing teaching portfolio, programmed teaching, tele-teaching, etc.

In-class practice: Lesson plans and analysis of teaching.

D406 – Computer Applications in Education (ECTS 2.0)

Computer Basics: Operating systems basics, office applications software, educational software.

Computer applications in education: Integrating technologies & educational software in course design and teaching. Development of multimedia presentations.

Networks – Internet: The educational potential of internet, internet as an educational tool, internet technologies and services and learning theories. Internet as an information resource (web browsing, searching for information, retrieval of information, information management and evaluation). Internet as communication and distance learning tool. Development of web-based educational material. Web page concept and design. Introduction to web-base teaching and learning activities.

Multimedia: Designing multimedia applications. Authoring tools.

Lab assignments.

5th SEMESTER

D501 – Structural Analysis II (ECTS 8.0)

Statically indeterminate structures – advantages and disadvantages over determinate structures. Analysis of statically indeterminate structures with virtual works method. Symmetric structures: symmetric and anti-symmetric loading. The Clapeyron method. The displacement method. The Cross method. Applications. Influence lines of indeterminate, applications to multispans beams.

D502 – Soil Mechanics (ECTS 6.0)

Introduction to Soil Mechanics. Soil composition. Phase diagram. Grain size. Plasticity. Identification and classification. Stresses and strains in soils. Water in soils. Effective stress concept. Permeability. Soil compressibility. Theory of consolidation. Stress-strain-strength of soils, failure criteria, behavior of saturated soils in drained and undrained conditions, unsaturated soils. Soil compaction.

Lab assignments: Soil moisture content. Apparent and specific gravity of cohesive soils, void index, porosity index. Grain-size analysis. Atterberg limits (liquid limit, plasticity limit, shrinkage limit). Triaxial tests. Direct shear test. Consolidation test. Permeability tests

D503 – Surveying (ECTS 8.0)

Basic concepts. Units of measurements. Length measurements and instruments used. Perpendicular lines and instruments used. Measurement of horizontal and vertical angles. Theodolite applications and methodology used. Area measurements. Total geodetic station. Tacheometry. Traverse alignments and types. Three fundamental problems. Calculations. Triangulation. Altimetry. Level instruments. Methods of measurements. Topographic plans.

Lab assignments: Area measurements. Mapping and area calculation of a plot using both the geometric method and the method of coordinates. Theodolite – measurement of horizontal and vertical angles. Level instrument – measurements of elevation differences. Planimeter, electronic planimeter, applications. Electronic theodolite (total geodetic station) – measurement of distances, angles, and elevations. Topographic mapping of a large area: polygonometry, tacheometry, and altimetry measurements.

D504 – Educational Evaluation (ECTS 4.0)

Introduction to the field. Theoretical background, contemporary evaluation theory, models, methods, techniques, context and application problems. Purpose and standards. Staff evaluation, school-based evaluation. Organization and presentation of data. Evaluation programmes and evaluation processes. Institutional framework. The role of evaluation in the curriculum.

Student evaluation. Theoretical background, goals and objectives. Methods and assessment techniques.

Student performance assessment – test construction and validation. Key elements involved in testing and grading, test anxiety. Higher education entrance exams. Marking and grading of papers and projects. Statistical analysis of test results; score interpretation. Presentation of data; different types of scales.

D505 – Educational Research Methodology (ECTS 4.0)

Philosophical background of scientific research (positivism, anti-positivism, phenomenology, etc). Fundamentals of empirical research. Empirical research methodology. Empirical research design and methods (formulation of research questions, goals and objectives, variables, hypotheses, funding, etc). Statistical criteria and techniques. Computer data processing. Writing a research paper – steps and instructions. National and European research institutes and programmes. Educational research institutes at national and European level.

6th SEMESTER

D601 – General Technology (ECTS 6.0)

The concept of technology. Technology and society. Linking technology with production. Primary, secondary, and tertiary production. Technological development and professions. The economy. Production organization and management. Study of technology (individual work). Study of production (collective work). The production line method in industry: method, research and experimentation. General Technology didactics in secondary education. Educational processes (seminars and lectures, presentations of projects, manufactures).

Lab assignments: Applications in the field (tools, instruments, apparatuses, machinery, materials, technical drawing, production line methods, scientific research). Individual research and team work.

D602 – Electrical & Mechanical Installations (ECTS 6.0)

Indoor installations regulations. Heat and sound insulation regulations. Fire protection of buildings. Heating, cooling and ventilation. Hydraulic installations (water supply – sewage/sewage). Transport installations. Electrical installations – lighting technology.

D603 – Reinforced Concrete (ECTS 7.0)

Basic principles of structures. Design methods of concrete structures. Concrete as building material. Introduction to reinforced concrete. Concrete-steel interfacial bond. Introduction to loading combinations. Design of beams, columns and plates under flexural loading. Design of reinforced concrete sections under shear loading and torsion moment. Required anchorage length of reinforced bars.

Lab assignments: Tests on concrete specimens – application of indirect methods. Flexural behavior of under and over-reinforced beams. Behavior of under reinforced beams under shear loading. Mapping and evaluation of cracking. Aspects of good practice of reinforcement placing. Visit to a working site.

D604 – Subject Didactics (ECTS 6.0)

Introduction to the field. The concept of job analysis; job analysis in vocational education and training. Professional knowledge and skills. Linking production with vocational education and training. Sample teaching analysis. Curriculum design principles and programmes of subject didactics – current trends. Comparison of vocational education and vocational training programmes.

Skill-based teaching. Demonstration and experiment. Individualized practice. Procedural knowledge and the strategy of effective teaching in subject didactics.

Declarative knowledge and teaching practices in vocational courses didactics; alternative applications. Development of learning enhancement strategies during teaching.

Lab assignments.

D605 – Educational Technology-Multimedia (ECTS 5.0)

Nature of technology and emergence of educational technology as a discipline. Learning theories as bases for technology integration models. Technology integration planning. Current educational technology systems and emerging trends. Integrating software tutors and tools into teaching and learning: educational software, basic software tools (word processing, spreadsheet and database programs), multimedia and hypermedia tools.

The internet as an educational tool: integrating the internet into teaching and learning. Research findings on the use of new technologies in different teaching and learning environments.

Lab assignments: Production, presentation and integration of educational material. Current and emerging information and communication technologies. Web-based teaching and learning activities. Teleconference, tele-education, distance learning.

7th SEMESTER

D701 – Steel and Timber Structures (ECTS 7.0)

Types and properties of steel. Introduction to the design of steel structures. Structural steel and timber. Design of steel elements (bars, beams) under various states of deformation. Advantages and disadvantages of steel structures, Eurocode 3. Tension of bars. Bending and torsion of beams. Buckling of beams under compression. Properties and use of bolts. Welding. Composite, trussed and variable section beams. Lateral-torsional buckling of beams. Buckling of girder webs.

Lab assignments: Tensile strength of steel beams. Compression tests. Bolt and connection test. Design of steel structures.

D702 – Seismology and Earthquake-Resistant Structures (ECTS 5.0)

Introduction to engineering seismology and earthquake engineering. Earthquake intensity and magnitude, scales. Seismic hazard and risk. Characteristics of strong earthquake ground motions. Response and design spectra. Structural response, ductility and behavior factors. Principles of earthquake resistant design, modern codes. Special topics of earthquake resistant structures.

Lab assignments: Estimation of maximum deflection and stress condition of structures under seismic loading, eigenvalues. Visit to a working site.

D703 – Hydraulics (ECTS 5.0)

Fluid properties, surface tension, capillary effect. Hydrostatic principle and buoyancy. Principles of fluid dynamics. Bernoulli, Euler and Navier-Stokes equations. Piezometric line, hydraulic losses and Moody diagram. Free surface flow, critical flow and hydraulic jump. Urban water supply, water transfer works, pumping stations and performance curves, water treatment plants. Urban sewage systems. Sewage networks. Sewage treatment plants, primary, secondary and tertiary treatment, biological treatment. Irrigation and drainage, irrigation methods, the Clement method.

Lab assignments: Properties of fluids, test methods for density and specific gravity. Measurement of viscosity using falling ball viscometers. Surface tension, capillary rise and fall. Hydrostatic pressure, demonstration of hydrostatic paradox. Buoyancy, the Archimedes' principle. Venturi flow meter. Applications of the Bernoulli equation. Linear and local losses. Hydraulic machines (Pelton turbine and centrifugal pump), performance curves. Open channel flow, determination of hydraulic jump elements.

D704 – Technical Legislation (ECTS 3.0)

Introduction to basic concepts: public and private works, auctions, contracts, ATOE, ATEO and ATHE rates, etc. Basic articles of Laws, Presidential Decrees, as well as circulars, ref. public and private works (Law 1418/84 “Public works and regulation of relative issues”, Presidential Decree 609/85 “Construction of public works”, Presidential Decree 472/85 “Composition of MEEP and MEK committees and other regulations”, Law 2576/98 “Improvement of procedures ref. assignment of public works construction” Law 795/93 “Granting of planning permissions”).

D705 – Foundation Engineering (ECTS 6.0)

Basics of foundations. Geotechnical site investigations, soil borings and in-situ tests. Bearing capacity of shallow foundations, selection of safety factors. Settlement of shallow foundations, selection of allowable values. Eurocode 7. Earth retaining structures - rigid and flexible. Bearing capacity and settlements of single piles and pile groups.

Lab assignments: Soil strength tests. Evaluation of compressive strength. Direct shear test. Triaxial tests. The Californian Bearing Ration test (CBR). Consolidation Test. Plate bearing test. Foundation design.

D716 – Techno-Economic Analysis (ECTS 4.0)

Cost estimation of technical works, cost categories (direct - indirect), additional cost items (general expenditure, construction/development profit, etc), cost calculation. Project analysis - expenditure budget, expected profit, cost-effectiveness of technical equipment, options of technical solutions and cost compatibility, cost optimization, typical construction budget examples.

D717 – Operational Research (ECTS 4.0)

Linear programming (Simplex method, transfer binaries). Non-linear programming, basics of quality control. Dynamic programming. Project management techniques (PERT-CPM). Investment models. Decision analysis, decision trees. Problem solutions by means of computer packages. Applications in the field.

8th SEMESTER

D801 – Teaching Practice (ECTS 6)

D802 – Practical Work Experience (ECTS ---)

D803 – Graduation Thesis (ECTS 24)