

**ASPETE  
DEPARTMENT OF ELECTRONIC 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:**

Μαρίνα Τορτορέλη, Καθηγήτρια, Τμήμα Εκπαιδευτικών Ηλεκτρονικής  
Γεράσιμος Παγιατάκης, Αναπλ. Καθηγητής, Τμήμα Εκπαιδευτικών Ηλεκτρονικής

**Απόφαση Συμβουλίου Τμήματος: 5/16.12.2008**

## 1<sup>st</sup> SEMESTER

### **HK101 – Mathematics I (Compulsory -ECTS 6.5)**

Linear algebra (matrices, determinants, linear systems, eigenvalues and eigenvectors), complex numbers, vector calculus and analytic geometry, differential and integral calculus of one variable, ordinary differential equations (first order and higher order differential equations, first and second order linear equations with constant coefficients), sequences-series (basic concepts, numerical series, convergence, function series, power series, applications in the field).

### **HK102 – Physics (Compulsory - ECTS 5.0)**

Kinematics and dynamics of particles. Work-energy. Dynamics of solid body, conservation of energy, momentum, and angular momentum. Oscillations. Waves. Optics.

Lab assignments.

### **HK103 – Electric Circuits I (Compulsory - ECTS 7.0)**

Basic concepts. Basic elements of electric circuits. Simple linear circuits; circuit elements combination (resistors, capacitors, inductors, voltage and current sources), voltage and current dividers, source transformations, variable resistances, resistance measurement). Circuit analysis techniques (mesh-current method, fundamental loop analysis, node-voltage method). Theorems of linear ohmic circuits (superposition, Thevenin and Norton, maximum power transfer, Millman, reciprocity, symmetrical circuits). Responses of linear circuits of 1<sup>st</sup> and 2<sup>nd</sup> order. Operational amplifiers.

Lab assignments.

### **HK104 – Computer Programming (Compulsory - ECTS 3.5)**

Number systems, arithmetic operations and conversions. The concept of algorithm. Algorithm structures. Flowcharts. Introduction to programming. Data types and sizes. Control commands. Relational and logic operators. Do loops. One- and two-dimensional matrices. Functions and block-structure of a programme. Other data structures (indicators, stacks, queues). Files. File access. Search techniques. Classification techniques.

Lab assignments.

### **HK105 – Introduction to Educational Sciences (Compulsory - ECTS 3.0)**

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.

### **HK106 – General and Developmental Psychology (Compulsory - ECTS 5.0)**

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.

## 2<sup>nd</sup> SEMESTER

### **HK201– Mathematics II (Compulsory - ECTS 6.5)**

Functions of multiple variables (definitions, partial derivative, total differential, composite and implicit functions, local maxima and minima, multiple integration, transforms). Differential

equations. The Laplace transform. Vector analysis (vector function of one or more variables, limit, continuity, derivative and differentials, space and plane curves, integration, line integral, surface integral). Probability and statistics. Special functions. Applications in the field.  
Lab assignments.

#### **HK202 – Electric Circuits II (Compulsory - ECTS 5.5)**

Signals (definition, categories and properties). Alternating current in steady state condition (definition, production, vector representation, complex representation, circuit elements, Kirchhoff's laws, combination of impedances, voltage and current dividers, capacitance measurement, inductance measurement). Circuit analysis techniques in steady state condition (mesh-current method, fundamental loop analysis, node-voltage method). Power in steady state condition (complex, real, reactive, apparent, power triangle, power factor, compensation). Theorems of linear circuits in steady state condition (superposition, Thevenin and Norton, maximum power transfer, Millman, symmetrical circuits). Circuit resonance (definitions, series, parallel, random circuit). Three-phase circuits (types and definitions, power calculations). Mutual inductance – magnetic circuits.

#### **HK203 – Component Technology and Design (Compulsory - ECTS 4.5)**

Resistors, capacitors, low and high frequency coils, optoelectronic elements, junction diodes, transistors, thyristor, triac, diac, crystals, oscillators, integrated circuits, transformers, autotransformers, ferrites, iron-cores, heat sinks, relays, batteries, display devices, microphones, loudspeakers, disks, magnetic tapes, cassettes, compact discs, optical fibers, antennas, computer-aided printed circuit board.  
Lab assignments.

#### **HK204 – Basic Electronics (Compulsory - ECTS 5.5)**

Fundamentals of semiconductors. Junction diodes: models and basic circuits. Special diodes (Zener, Schottky, Varactor). Rectifiers and clippers. Bipolar junction transistors: equivalent circuit models of weak signal, biasing techniques and basic single-stage amplifiers. Field-effect transistor (JFET, MOSFET).  
Lab assignments.

#### **HK205 – Philosophy-Sociology of Education (Compulsory - ECTS 4.0)**

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.

Sociology of Technical & Vocational Education. Main theoretical streams. Science and technical studies in recent years and in postindustrial society, "technoscience". Technical & Vocational Education and new technologies.

#### **HK206 – Educational Psychology (Compulsory - ECTS 4.0)**

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.

### 3<sup>rd</sup> SEMESTER

#### **HK301 – Applied Mathematics (Compulsory - ECTS 5.0)**

Laplace transform: Laplace transform of basic functions, inverse Laplace transform, application of Laplace transform to differential equations. Fourier analysis: Periodic harmonic functions, Fourier series, Fourier transform, Parseval's theorem, frequency spectrum and graphic methods of harmonic analysis. Vector analysis: Vector functions of one or more variables, vector operators and field theory, line and surface integrals. Statistics: Normal distribution, confidence intervals, hypothesis tests. Applications in the field.

Lab assignments.

#### **HK302 – Digital Systems (Compulsory - ECTS 6.0)**

Number systems. Binary logic - Boolean algebra. Logic gates. Simplification of logic functions: Karnaugh maps, Mc. Cluskey algorithm. Analysis and design of combinational circuits. Applications. Flip-flops: D, T, SR, JK, Master-Slave JK. Characteristic equations and tables, excitation tables. Design of sequential circuits. Applications: Design of counters, up and down counters, etc. Medium scale integrated circuits (MSI): encoders, decoders, multiplexers, demultiplexers, read-only memory (ROM), programmable logic arrays (PLA, PAL, etc). Registers, shifters, counters, random access memory (RAM). The arithmetic logic unit (ALU). (Finite) algorithmic state machines (ASM). Control units. Families of integrated circuits.

Lab assignments.

#### **HK303 – Electronics I (Compulsory - ECTS 6.0)**

Introduction to amplifiers, classes of operation, class A, push-pull, power amplifiers. Darlington pair. Multi-stage amplifiers. Differential amplifiers. Operational amplifiers. Operational amplifiers with feedback. Gain and phase compensation and margins. Basics of industrial electronics.

Lab assignments.

#### **HK304 – Circuit Theory (Compulsory - ECTS 5.0)**

The Laplace transform in circuit analysis (definitions, properties, circuit solutions). The Fourier series (definitions, properties, circuit solutions). The Fourier transform in circuit analysis (definitions, properties, circuit solutions). State equations (definitions, properties, circuit solutions, observability, controllability etc). Discrete-time circuits– Z-transform. Two-port circuits (definitions, connections, terminated two-port circuits, filters, etc).

#### **HK305 – Educational Management and Policy (Compulsory - ECTS 4.0)**

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.

#### **HK306 – Counselling Psychology and Guidance (Compulsory - ECTS 4.0)**

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.

#### 4<sup>th</sup> SEMESTER

##### **HK401 – Environmental Protection (Compulsory - ECTS 5.0)**

Environment and environmental protection. Basics of ecology. The environmental crisis. Current environmental problems. Natural resources. Effects of human interaction with the environment. Sustainable development. International and EU policy on sustainable development. Environmental legislation. Environmental consequences. Environmental education. Environmental education methodology. Design, implementation and evaluation of environmental education programmes.

##### **HK402 – Electronic Measurements (Compulsory - ECTS 6.0)**

Introduction to electronic measurements. Analogue measurements. Oscilloscopes: internal structure, vertical and horizontal amplifier circuits, triggering, scanning, Z-amplifier. Measurements of voltage, period, frequency, phase-difference, pulse parameters, response curve, modulation index. Digital instruments. Digital measurements: voltage, current, resistance, power and frequency. Lab assignments.

##### **HK403 – Electronics II (Compulsory - ECTS 6.0)**

Feedback, step and frequency response. Bode diagrams. Analysis and design of amplifiers with feedback. Gain and phase compensation and margins. Oscillation and stability. Operational amplifiers - applications. Integrated circuits in electronic systems. Analogue integrators, filters and delay equalizers. Comparators and sampling circuits. Nonlinear analogue circuits, logarithmic amplifiers, waveform generators. MOS digital circuits, analogue integrated circuits. Lab assignments.

##### **HK404 – Foreign Language - LSP (Compulsory - ECTS 5.0)**

A learner-centered approach to English for Specific Purposes (ESP) in the context of electronic 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).

##### **HK405 – Teaching Methodology (Compulsory - ECTS 6.0)**

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.

##### **HK406 – Computer Applications in Education H/Y (Compulsory - 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.

## 5<sup>th</sup> SEMESTER

### **HK501 – Analogue and Digital Filters (Compulsory - ECTS 4.0)**

Passive filters, passive filter design (Butterworth, Chebyshev, Bessel). Active filters, active filter design. Digital filters. Switched-capacitors filters.

Lab assignments.

### **HK502 – Automatic Control Systems I (Compulsory - ECTS 7.0)**

Basic concepts. System description (mathematical models, transfer function, impulse response). Block diagrams and relevant rules (series, parallel, summation, etc) – Simplification of block diagrams. Solutions of control systems in time and frequency domain (time response of first and second order systems). System errors in steady state. Stability of automatic control systems – algebraic criteria. Stability of automatic control systems–geometric criteria: root locus, Nyquist, Bode, harmonic response. Control systems equipment (DC motors, AC motors, hydraulic servo motor, servomechanism, etc). Practices and applications. Logic control.

Lab assignments.

### **HK503 – Telecommunication Systems I (Compulsory - ECTS 7.0)**

Basic concepts and historic review. Signals. Noise, different types of noise, signal transmission in the presence of noise. Basics of information theory. Transmission techniques: Modulation and multiplexing systems. Amplitude Modulation (AM). Frequency Modulation (FM). Frequency Division Multiplexing (FDM) - applications. Pulse modulation. Pulse Code Modulation (PCM) and Time Division Multiplexing (TDM) - applications. Delta modulation. Amplitude-Shift Keying (ASK) - applications. Frequency-Shift Keying (FSK). Phase-Locked Loop (PLL) - applications. Phase-Shift Keying (PSK) - applications. Quadrature Amplitude Shift Keying (QASK) - applications. Digital Multitone Modulation (DMT) - applications. Synchronous Digital Hierarchy (SDH). Signal to noise calculations in analogue and digital receivers.

Lab assignments.

### **HK504 – Electromagnetic Theory (Compulsory - ECTS 5.0)**

Electrostatic field. Electric charge and Coulomb's law. Electric field, electric field intensity and potential, electric potential energy, rotational and irrotational fields. Gauss law. Laplace and Poisson equations. Capacitance and dielectric materials. Electrodynamics. Electric current, resistance, and Ohm's law. Energy and power in electric circuits. Conductivity of metals. Charging and discharging of capacitors. Magnetism. Magnetic field. Force on a moving electric charge and a conductor. Force and torque on current loops. Magnetic flux. Magnetic field of a moving electric field and a conductor - the Biot-Savart law. Ampere's law. Magnetic materials, self-inductance, mutual inductance, permanent magnets, magnetic circuits. Faraday's law. Lenz's law. Maxwell's equations (integral and vector form). Special topics: Coherent radiation emission. Laser applications.

### **HK505 – Educational Research Methodology (Compulsory - ECTS 3.5)**

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.

### **HK506 – Educational Evaluation (Compulsory - ECTS 3.5)**

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.

## 6<sup>th</sup> SEMESTER

### **HK601 – Microcomputers (Compulsory - ECTS 5.5)**

Microprocessors, micro-controllers, microcomputers, digital signal processing (DSP) and application-specific integrated circuits (ASIC). Microprocessor structure and operation: ALU, timing and control unit, general-purpose and special-purpose registers. Timing diagrams. Microprocessor programming: Assembly language and machine code. Microprocessor access. The ROM and RAM connections. Input-output unit connections. Parallel data input-output through the IEEE 488 protocol. Serial data input-output through the RS 232, RS 422, RS 423, RS 449 and RS 485 protocols. Microprocessors 8/16/32 bit (Z80, 8086, 8088, 68000, etc). Micro-controllers 8/16/32 bit (Z8, 8051, 80196, PIC, AVR, etc).

Lab assignments.

### **HK602 – Automatic Control System II (Compulsory - ECTS 5.0)**

PID controllers (proportional, proportional and integral, proportional and differential, proportional-integral and differential control). State equations (impulse response, system eigenvalues, SISO systems, MIMO systems, state space configurations of systems). Time response of control systems in state domain. System controllability and observability. Design of automatic control systems (state vector, output vector, eigenvalues, state observers, optimal control). Analogue computer. Nonlinear automatic control systems (describing function method, phase plane method, Lyapunov stability theory).

Lab assignments.

### **HK603 – Telecommunication Systems II (Compulsory - ECTS 5.5)**

Transmission media – link types: Comparative study of link types (cable, optical, wireless). Transmission lines. Fiber links: Structure, equipment, applications, calculations and implementation. Ground and satellite microwave links: Structure, equipment, applications, calculations and implementation. Telecommunication services and applications: Main telecommunication services. Telephony. Integrated services digital network (ISDN). Mobile communications. High bit-rate digital subscriber lines (xDSLs), optical access networks (FITL). The new telecommunications environment.

Lab assignments.

### **HK604 – Subject Didactics (Compulsory - 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.

### **HK605 – Educational Technology-Multimedia (Compulsory - ECTS 4.0)**

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.

### **HK606 – Operational Research (Compulsory - 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.

### **HK607 – Techno-Economic Analysis (Compulsory - ECTS 4.0)**

The concept of market, market forms, demand and offer, individual consumer behaviour, cost estimation, cost indicators, price determination, cost-effectiveness, production functions, active demand, budget planning, balance of payments, the role of interest rates, inflation, pricing techniques, principles of economic planning. Economic criteria, cost equations and cost optimization. Case-studies.

## **7<sup>th</sup> SEMESTER**

### **HK701 – Communications and Computer Networks (Compulsory -ECTS 8.0)**

Network topology. Geographic distribution of networks. Telecommunication networks (public switched telephone network, leased line network, integrated services digital networks). Network techniques (circuit-switched and packet-switched networks, etc). Network software (Windows NT, etc). OSI and TCP/IP models. Physical layer. Transmission media (cables, optical fibers, satellites). Analogue transmission (telephone system, modems). Digital transmission (PCM, X.21). Aloha protocol. Local-network protocols (IEEE 802, CSMA, BRAR, MLMA). Fiber optic networks. Medium-access layer. Data-link layer (protocols, error detection and correction). Network layer (routing algorithms, open loop algorithms, network interconnection). Transport layer (protocols, connection management). Session layer (data exchange, synchronization, management). Presentation layer (data compression, network security). Application layer (transfer, access and management of files, e-mail, virtual circuits, multimedia services, website). Wireless local networks (IEEE 802.11, Hiperlan). Broadband networks (B-ISDN, ATM). Mobile communications networks. Cellular systems. Third generation systems. Internet and multimedia services in personal mobile communication devices.

Lab assignments.

### **HK702 – Broadcast Systems (Compulsory - ECTS 8.0)**

Electromagnetic spectrum and radio-frequencies. Emission and reception of audio signals: Modulation techniques (AM, SSB, VSB, FM, PM), audio transmitters (AM, FM, FM-stereo), audio receivers (superheterodyne, AM, FM, FM-stereo), properties of receivers and relevant measurements, alignment techniques, tuning circuits and supplementary devices, digital audio (ground and satellite). Noise and interference. Electroacoustics: Principles of magnetic recording and reproduction of sound – tape recorders, compact disks and compact disk players, digital tape-players, electroacoustic transducers, loudspeakers and sound reception. The TV signal: Coloured TV systems (NTSC, PAL, SECAM), PAL signal, PAL digitization (SDI signal), SDI compression according to MPEG2 standards. The coloured TV-receiver: Selection unit, intermediate frequency and demodulation units, synchronization unit, horizontal and vertical scanning, AFC and AGC circuits, power supply units, control unit, remote control devices. Terrestrial emission and reception of TV signals: Cameras and imagers, structure and operation of TV stations, TV-signal distribution, TV frequencies, broadcasting centers, home antennas (individual-type and central), central antenna installation, supplementary signals (eg teletext). Satellite TV: Satellite link (earth station-satellite), satellite link budget, satellite TV broadcasting (signal processing at the earth station, transmission to the satellite, reception by the satellite and retransmission), satellite TV reception (home antennas, TV sets). TV signal recording and reproduction: Video and video tapes, digital video (DVD), home cinema.

Lab assignments.

### **HK703 – Microwaves-Antennas (Compulsory - ECTS 6.0)**

Introduction: Maxwell equations and electromagnetic potentials. Transmission of electromagnetic waves. Microwave frequency band. Microwaves: Transmission lines. Transmission of electromagnetic waves in waveguides. Passive microwave components. Matching problems. Electromagnetic cavities. Microstrips, multiport components, directional couplers. Ferrite elements. Microwave filters. Microwave printed circuits. Microwave amplifiers. Microwave sensors. Microwave tubes and solid state devices. Microwave integrated circuits. Microwave devices. Electromagnetic compatibility. Antennas: Basic concepts. Hertz dipole. Linear dipole antennas, loop

and helix antennas. Far-field analysis. Antenna arrays. Antenna feeding. Reflectors, slot antennas, horn antennas, microstrip antennas, lens antennas. Wireless links: Terrestrial propagation of electromagnetic waves. Introduction to wireless links, radar.

Lab assignments.

**HK704 – General Technology (Compulsory - ECTS 5.0)**

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.

**HK705 – Technical Legislation (Compulsory - ECTS 3.0)**

Public works design – project assignment and execution (request for interest and qualifications, consultant selection committee). The project assignment contract (clauses, contractual obligations, liability, contract problems, arbitration). Engineering fees and payments. Public works contract (clauses, project management and supervision, public works auction and tenders, public works construction, contract problems, arbitration). Contract laws. Public works laws. Contract and auction templates.

**8<sup>th</sup> SEMESTER**

**HK801 – Teaching Practice (Compulsory - ECTS 6.0)**

**HK802 – Practical Work Experience (Compulsory - ECTS ---)**

**HK803 – Graduation Thesis (Compulsory - ECTS 24)**