School of Electrical and Computer Engineering



Undergraduate Program Guide 2022 – 2023

Dear reader,

The School of Electrical and Computer Engineering (ECE) is one of the five engineering Schools at the Technical University of Crete. The ECE School is the descendant of the School of Electronic and Computer Engineering, which was founded in the late 1980s and admitted for the first time 30 students in 1990. Today the School employs 28 faculty members, from which more than half have completed the PhD studies in prestigious universities abroad and quite a few have worked abroad before joining. Moreover the School employs 24 scientific staff members and 2 administrative staff members and welcomes every year approximately 215 first-year students.

The ECE School offers an undergraduate program of studies, two graduate ones, as well as a PhD program. School's infrastructure includes 11 education/research laboratories that support undergraduate and graduate education as well as internationally competitive research supported from competitive national and international funding (mainly from the EU). A significant part of the 1584 graduates of the School have successful careers in different professions whereas many have done graduate studies both in Greece and abroad. Some of our graduates serve as faculty members in universities in North America, Europe, and Greece, are researchers in international and Greek research institutions, work as successful professionals in large companies (in Greece and abroad) or have founded their own.

The scientific areas of the ECE School cover the entire spectrum of the Electrical and Computer Engineering curriculum, i.e., Computer Science, Electronics and Computer Architecture, Telecommunications, Electric Energy Systems, and Systems of Automatic Control, as well as the basic sciences of Mathematics and Physics. Our students receive in-depth training in all of these subjects. The School of ECE places great emphasis on the rigorous and well-rounded education of its students. For this reason, most of the undergraduate courses have a laboratory component for hands-on experience to complement the theoretical knowledge conveyed in the lectures. The laboratory work is conducted in the same laboratories where diploma theses and graduate research are carried out and thus undergraduate students are acquainted with the research conducted in the ECE School from the early years of their studies.

Research is an integral and highly-valued part of the School's activities, because it allows the School to actively participate in the advancement of science in the international arena and has direct benefits to our educational efforts. The research conducted by members of the ECE School has led to significant international recognition and awards, including multiple best paper awards. The School's international orientation is also evident in the participation and frequent distinction of undergraduate and graduate student groups in international competitions.

More information regarding the ECE School is available on the website www.ece.tuc.gr. Clarifications regarding procedural and administrative matters can be addressed to the Head of School's Administrative Department, Mrs. Vassiliki Grigoraki (e-mail: ece_secretary@tuc.gr, tel. 28210-37218), and the Dean of the ECE School, Prof. George Karystinos (e-mail: ece_dean@tuc.gr, tel. 28210-37343).

Sincerely,

George Karystinos

Professor and Dean of the School of Electrical and Computer Engineering

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The Technical University of Crete

The Technical University of Crete is Greece's second technical university, devoted to engineering education. It was established in 1977 and admitted its first students ever at the School of Production Engineering and Management in 1984. The mission of the Technical University of Crete is to advance education and research in new technologies, as well as the establishment of a high quality scientific and technological institution which is in close cooperation with the production forces of the country. There are five Schools at the Technical University of Crete.

- School of Production and Management Engineering
- School of Mineral Resources Engineering
- School of Electrical and Computer Engineering
- School of Chemical and Environmental Engineering
- School of Architecture

The School of Electrical and Computer Engineering

Mission Statement

The studies at the School of Electrical and Computer Engineering (ECE) of the Technical University of Crete are aimed at the education and high-level technical training of engineers in modern technology subjects found in the fields of IT, electronics and computer architecture, telecommunications, electric energy systems, and automatic control systems. Its purpose is for the students to acquire the necessary theoretical knowledge which will allow them to understand in depth the fundamental principles of new technologies in all the above areas, so that they can adapt and follow easily any new developments in any sector.

Computers play a central role in all technology sectors above. Studies at the ECE School emphasize the use of computers in applications in various areas of technology, such as electronic circuit design, integrated systems for factories, robotics and automation, telecommunications systems, distributed computing and information systems, companies, and implementation of digital systems.

Most of the cost of a computer system, today, corresponds to the software and not the hardware, with the latter having a decreasing cost at a rapid rate. Graduates of the ECE School acquire comprehensive and in-depth knowledge of all software principles and are suitable to staff and play a leading role in any company or organization as software engineers. Indicatively, there are needs in the market for computerization (payroll, cataloguing of goods, automation of orders, etc.), for handling large volumes of data (bank accounts, travel and hotel reservations, airline reservations, patient lists in hospitals, etc.), for the digitalization of operations in offices and organizations (government agencies, insurance organizations, etc.). Effectively dealing with such problems requires specialized knowledge of planning and handling large databases and complex information systems, knowledge possessed by the graduates of our School. Special mention should also be made of the expertise provided at the School in key scientific fields of Information Technology, such as design and development of information systems, programming in distributed and parallel systems, medical data processing, graphical and virtual reality applications, development of applications on the Internet, programming of autonomous robotic systems, data management in sensor networks, and artificial intelligence technics for solving complex problems. With the above resources, the graduates of our School are sufficiently qualified to work in the businesses of the future that will be active in areas such as e-commerce, distance education, distant medical care, online entertainment and information systems, digital libraries, etc.

In today's industries, electronic sensors and control systems must operate safely and without interruption, often under adverse conditions. Of particular importance are embedded microprocessors and microcontrollers and their uses in many electrical and electronic devices with real-time requirements (real-time systems) in a multitude of applications, such as automobiles, factories, traffic control, airports and aircrafts, robotics, automatic assembly, quality control, automated home installations, greenhouses, etc. The students of the ECE School are trained in modern methods of analysis and design of electrical and electronic circuits. They learn how basic electronic components (diodes, transistors, integrated circuits) work, how to design circuits involving analog and/or digital integrated circuits, and how to design power amplifiers, RF circuits, and large-scale integration circuits (VLSI chips). This knowledge is consolidated through laboratory exercises, which bring students into direct contact with the relevant material and appropriate tools and provide valuable practical experience.

Telecommunications are spreading rapidly throughout the world. The students of the Faculty acquire knowledge and deepen their knowledge in digital telecommunications (digital transmission, wired and wireless communications, mobile communications, satellite communications, information and coding theory, computer networks), but also in modern telecommunications applications, based on automatic voice recognition and speech processing (voice dialing, remote speech responsive database access, etc.), so that they can be employed in organizations and telecommunications companies. In addition, computer communication networks, in addition to basic data, now transfer voice, images, and video between computer systems around the world. Computer network connections are particularly important nowadays for companies and organizations, due to the rapid spread of the Internet, the upgrading of the telecommunications infrastructure in Europe and Greece and the prevalence of distributed computing systems. In fact, large companies and organizations are increasingly turning to secure private networks to adequately meet their needs in a vital area. The students of the ECE School acquire the necessary theoretical background and experience that will allow them to work creatively with a wide range of topics related to telecommunications.

Automatic control systems are very widespread and are used in a variety of important applications. The development of control systems and their successful integration into automated environments is a difficult undertaking that requires in-depth theoretical and practical training in systems analysis, design and simulation. The students are educated in depth in the theory of automatic control systems acquiring the skills required to design efficient control systems of complex processes. In recent years, the issues of reducing dependence on oil, saving energy, increasing the production of electricity from clean and renewable energy resources and increasing the efficiency of production, transmission and distribution processes as well as electricity consumption in the context of environmental protection, have emerged as extremely important at global and European level. Considering the imperative need to respond to the socio-economic activities brought about by the rapid developments in the field of electric energy, the ECE School has integrated the treatment of cutting-edge energy technologies into its curriculum. The School's training provides industry and society with high-level specialized engineers and consultants necessary for the country's development in the modern energy sector.

The theoretical and applied knowledge given to the students of the School supports them in developing applied thinking for solving modern complex technological problems in the above sectors and building the ability to compete and collaborate nationally and globally with their Greek and foreign colleagues. In addition, the undergraduate studies aim to equip students with a very strong background for pursuing graduate studies and joining world leading research groups after graduation. An important milestone in each student's studies is the final-year Diploma thesis, in close collaboration with his supervising professor. In addition to the opportunity to delve deeper into the subject of the thesis, the student also practices working responsibly and independently with the aim of presenting a comprehensive thesis as the culmination of his studies. Quite often the results of a thesis lead to a publication in a prestigious international conference or fully refereed journal.

Professional Rights

The professional rights of Graduate Electrical Engineers are determined by Law 6422/1934 on the exercise of the profession of Mechanical-Electrical Engineer, together with the relevant Royal or Presidential decrees. According to them, the framework of the rights regarding the study, the supervision of the construction and the supervision of the operation of electrical and mechanical installations is determined. The newest law 3982/2011 "Simplification of the licensing of technical professional and manufacturing activities" defines as "Professional Activities" the "works for the implementation of the design of a mechanical or electrical installation, for the construction of said installation, its maintenance, the supervision of its operation and the handling of its equipment, the provision of technical service, the execution of technical work, as well as related work". With article 228 of law 4072/2011, significant amendments were made to law 3982/2011, with the aim of expanding the regulated scope of activities. Law 4254/2014 liberalizes the exercise of the profession. Presidential Decree 99/2018 regulates the engineering profession by defining the professional rights for each specialty. Graduates of the School can carry out these activities by simply announcing and registering them in the respective registers of the General Secretariat of Industry. Detailed information on the applicable decrees is provided on the relevant website of the Technical Chamber of Greece.

Graduates of the ECE School, in accordance with the provisions in force at any given time, may engage in

- a) teaching in University and Technological Educational Institutions, secondary education, and technical and professional training, public and private, at a theoretical, technological, and applied level in the scientific fields of IT and telecommunications listed above,
- b) research in public and private research centers in the scientific fields listed above at a theoretical, technological, and applied level,
- c) the offer of services IT units, in networks units, in computerization and technical services of ministries, in public organizations, in electronic communications businesses. In addition, they could work in IT services for banking, insurance, medical, energy, mass media, audio-visual production and processing companies; in transport, shipping, tourism, business consulting and high-tech companies.

School Administration

The School is managed by the Dean, the Dean Council, and the School Assembly. The responsibilities and the method of election of the above bodies are determined by the current Framework Law on Higher Education and its amendments.

Faculty and Staff

The faculty and staff of the School are in the following categories.

a. Faculty

The professors are scientists who carry out the teaching and research work of the School. Teaching includes the independent teaching of a course, the independent teaching of in-depth courses in small groups of students, laboratory exercises and the general applied training of students, the supervision of theses or dissertations and the organization of seminars or other similar activities aimed at the consolidation of students' knowledge. The research work includes basic or applied research, supervision of diploma, master's and doctoral theses and participation in conferences and research seminars. All professors hold a Doctorate Degree and are distinguished in three ranks: Professors, Associate Professors, and Assistant Professors.

b. Laboratory Teaching Staff

Laboratory Teaching Staff members carry out laboratory/applied teaching work, which mainly consists of

conducting laboratory exercises, as well as conducting practical exercises. Holders of a doctoral degree may be assigned independent teaching work and supervision of diploma or other theses, under the supervision of faculty members.

c. Laboratory Technical Staff

Laboratory Technical Staff members provide support work to the general operation of the School, offering specialized technical laboratory services for the better execution of the educational, research and applied work of the School.

d. Administrative Staff

The administrative staff includes employees of various ranks reporting to the central administration of the Technical University of Crete. The administrative staff members support the administrative operations of the School, such as management of student records, School archives, course registrations, grade reports, etc.

Faculty members - Professors

Dimitrios Angelakis, Associate Professor

B.Sc. University of Crete, 1997. M.Sc. University of Crete, 1999. Ph.D. Imperial College London, United Kingdom, 2002.

Quantum Optics, Quantum Technologies, Nanophotonics, Quantum Information and Computing, Quantum Simulators.

Konstantinos Balas, Professor

B.Sc. University of Patras, 1988. Ph.D. University of Patras, 1992.

Optoelectronics, Optoelectronic Devices, Optical Detectors and Imaging Systems, Hyperspectral Imaging, Non-Destructive Analysis, Biophotonics, Tissue Spectroscopy, Optical Biopsy, Innovative Optical Diagnostic Technologies, Systems for Cancer Diagnosis.

Nikolaos Bekiaris-Lymperis, Associate Professor

B.Sc. National Technical University of Athens, 2007; M.Sc. University of California, San Diego, USA, 2010; Ph.D. University of California, San Diego, USA, 2013.

Control of distributed parameter systems, systems with delays, nonlinear control, adaptive control. Traffic flow control and estimation, connected and automated vehicle control, occupancy detection in smart buildings, vehicle catalyst control, vibration control in oil extraction, networked control systems.

Aggelos Bletsas, Professor

B.Sc. Aristotle University of Thessaloniki, 1998; M.Sc. Massachusetts Institute of Technology, USA, 2001; Ph.D. Massachusetts Institute of Technology, USA, 2005.

Design and Implementation of Wireless Transmission Networks, Design and Implementation of Software-Driven Receivers (SDR), Backscatter Sensor Networks and RFID, Time and Frequency Metrology, Bibliometrics.

Matthias Bucher, Associate Professor

B.Sc. Swiss Federal Institute of Technology, Lausanne, Switzerland, 1993; Ph.D. Swiss Federal Institute of Technology, Lausanne, Switzerland, 1999.

Analog Integrated Circuit Design Methods, Semiconductor Device Physics and CMOS Technology, Analysis, Characterization and Modeling of Active and Passive Devices for High Frequencies, Development of Computer Aided Design Tools.

Georgios Chalkiadakis, Associate Professor

B.Sc. University of Crete, 1997. M.Sc. University of Crete, 1999. Ph.D. University of Toronto, Canada, 2007.

Decision Making under Uncertainty, Multi-Agent Systems, Learning in Multi-Agent Environments, Game Theory, Agent Technologies for the Smart Grid.

Dionysios Christopoulos, Professor

B.Sc. National Technical University of Athens, 1985, Ph.D. Princeton University, 1991.

Applications of Time Series and Random Fields in Spatially Compartmentalized Systems, Geostatistical Analysis of Environmental Systems and Energy Resources, Applications of Statistical Physics in Spatio-Temporal Data Analysis and Neuroscience, Statistical Learning Methods.

Antonios Deligiannakis, Professor

B.Sc. M.Sc. University of Maryland, USA, 2001; Ph.D. University of Maryland, USA, 2005.

Data Bases, Analytical Data Processing, Approximate Question Evaluation, Sensor Networks, Data Flows.

Vassilios Digalakis, Professor

B.Sc. National Technical University of Athens, 1986. M.Sc. Northeastern University, USA, 1988; Ph.D. Boston University, USA, 1992.

Speech Recognition and Speech Processing, Digital Telecommunications.

Apostolos Dollas, Professor

B.Sc. University of Illinois at Urbana Champaign, USA, 1982. M.Sc. University of Illinois at Urbana Champaign, USA, 1984. Ph.D. University of Illinois at Urbana Champaign, USA, 1987.

Computer Hardware, Reordered Logic, Computer Architecture, Rapid Systems Development, Special Purpose Architectures.

Minos Garofalakis, Professor

B.Sc. University of Patras, 1992; M.Sc. University of Wisconsin-Madison, USA, 1994; Ph.D. University of Wisconsin-Madison, USA, 1998.

Database Systems, Data Flows, Data Summaries and Approximate Question Evaluation, Probabilistic and Uncertain Databases, Network Data Management, XML/Text Databases, Data Mining.

Konstantinos Gyftakis, Associate Professor

5-year Diploma, University of Patras, 2010; Ph.D. University of Patras, 2015.

Eletrical Machines, Fault Diagnosis and Prognosis in Electrical Machines, Condition Monitoring, Electromagnetic Analysis of Electrical Machines, Design of Electrical Machines

Sotirios Ioannidis, Associate Professor

B.Sc. University of Crete, 1994. University of Crete, 1996 and University of Rochester, 1998. Ph.D. University of Pennsylvania, 2005.

Computer Security, Privacy, Computer Systems, Computer Hardware.

Fotios Kanellos, Associate Professor

B.Sc. National Technical University of Athens, 1998. Ph.D. National Technical University of Athens, 2003.

Power systems, Modeling of power grids with distributed generation, Design and development of power transmission systems, Wind turbine modeling, Automatic control of wind turbines, Optimal operation and modeling of the fully electrified ship, Smart Grids, Microgrids, Optimal management of electric

vehicles, Advanced methods of flexible load management.

George Karystinos, Professor

B.Sc. University of Patras, 1997; Ph.D. State University of New York at Buffalo, USA, 2003.

Telecommunication theory and systems, Information theory and coding, Statistical signal and data processing.

Eftychios Koutroulis, Professor

B.Sc. Technical University of Crete, 1996. M.Sc. Technical University of Crete, 1999. Ph.D. Technical University of Crete, 2002.

Design and implementation of microelectronic circuits and systems, electronic energy management systems, Renewable Energy Sources, energy harvesting, power electronics, electronic measurement systems.

Michael Lagoudakis, Professor

B.Sc. M.Sc. University of Louisiana, Lafayette, USA, 1998; Ph.D. Duke University, USA, 2003.

Machine Learning, Artificial Intelligence, Decision Making under Uncertainty, Robotics, Autonomous Agents, Multi-agent Systems.

Athanasios Liavas, Professor

B.Sc. University of Patras, 1989. Ph.D. University of Patras, 1993.

Signal Processing, Digital Telecommunications, Machine Learning, Optimization, Parallel Algorithms.

Aikaterini Mania, Professor

B.Sc. University of Crete, 1994; M.Sc. University of Bristol, UK, 1996; Ph.D. University of Bristol, UK, 2001.

3D Computer Graphics, Virtual Reality, Emulator Fidelity Measures, Human-Computer Communication, Visual Perception.

Daphne Manousaki, Assistant Professor

B.Sc. University of Oxford, UK, 1991; M.Sc. University of Washington, USA, 1995; Ph.D. University of Washington, USA, 1996.

Mathematical Description and Study of Problems in Medicine, Physiology and Biology, Cellular Mechanics, Computational Simulation, Ordinary and Partial Differential Equations.

Michael Paterakis, Professor

B.Sc. National Technical University of Athens, 1984. M.Sc. University of Connecticut, USA, 1986. Ph.D. University of Virginia, USA, 1988.

Communication Networks, Communication Network Protocols, Stochastic Modeling and Performance Analysis of Communication Network and Information Systems Protocols, Broadband Wired and Wireless Unified Services Communication Networks.

Euripides Petrakis, Professor

B.Sc. National and Kapodistrian University of Athens, 1984; Ph.D. University of Crete, 1993.

Information Systems, Multimedia Systems, Medical Information Systems, Semantic Web, Machine Vision Applications.

Minos Petrakis, Associate Professor

B.Sc. National and Kapodistrian University of Athens, 1980. M.Sc. University of Illinois at Urbana Champaign, USA, 1982; Ph.D. University of Illinois at Urbana Champaign, USA, 1987.

Correlational Analysis, Banach Space Theory, Operators on L1, Martingales in Banach Spaces, Non-Dentable Subsets of Banach Spaces, Vector Measures.

Vassilios Samoladas, Associate Professor

B.Sc. Aristotle University of Thessaloniki, 1992; M.Sc. University of Texas at Austin, USA, 1995; Ph.D. University of Texas at Austin, USA, 2001.

Computational Geometry, Algorithmic Complexity in Multidimensional Problems, Database Complexity, Distributed Information Systems, Parallel Programming.

Thrasyvoulos Spyropoulos, Professor

B.Sc. National Technical University of Athens, 1992. MSc University of Texas at Austin, USA 1995. Ph.D. University of Texas at Austin, USA 2006.

Communication and computer networks, Modelling of stochastic processes and systems. Theory of continuous, discrete and distributed optimization. Social networks. Recommendation algorithms. Artificial intelligence and machine learning with applications in network problems.

George Stavrakakis, Professor

B.Sc. National Technical University of Athens, 1980. M.Sc. Institut National des Sciences Appliquees, Toulouse, France, 1981; Ph.D. Universite Paul Sabatier (Toulouse III), France, 1984.

Modelling and Electronic Control of Production Systems, Energy Systems and Renewable Energy Sources, Reliability Analysis and Automatic Fault Diagnosis of Systems, Applications of Electronics and Informatics in Industry.

Michael Zervakis, Professor

B.Sc. Aristotle University of Thessaloniki, 1983. M.Sc. University of Toronto, Canada, 1985; Ph.D. University of Toronto, Canada, 1990.

Digital Image and Signal Processing, Biomedical Applications.

Laboratory Teaching Staff

Stamatios Andrianakis

B.Sc. Aristotle University of Thessaloniki. M.Sc. Technical University of Crete.

Signal Processing for Telecommunications and Software Applications for Telecommunication Device Support.

Georgios Anestis

B.Sc. Technical University of Crete, M.Sc. Technical University of Crete

Software Engineering, Databases, Application Development - Internet and Distributed Systems.

Polyxeni Arapi

B.Sc. Technical University of Crete. M.Sc. Technical University of Crete, Ph.D. Bulgarian Academy of Sciences, Bulgaria.

Software Engineering with emphasis on Programming, Internet Information Systems and Learning Support.

Spyridon Argyropoulos

B.Sc. University of Patras. M.Sc. Technical University of Crete.

Software Engineering with Emphasis on Programming and Intelligent Computing Systems Technology.

Christos Arvanitis

B.Sc. University of Crete. M.Sc. University of Crete. Ph.D. University of Crete.

Mathematics, Numerical Analysis, Computational Science.

Sotirios Bouros

B.Sc. University of Patras. M.Sc. Technical University of Crete

Design, Development, Implementation and Management of Computer Networks.

Vassilios Diakoloukas

B.Sc. University of Crete. Ph.D. Technical University of Crete.

Speech Processing and Applications in Dialogue Systems.

Emmanuel Doudounakis

B.Sc. National Technical University of Athens. M.Sc. Technical University of Crete.

Automatic Control.

Nektarios Gioldasis

B.Sc. University of Macedonia. M.Sc. Technical University of Crete.

Analysis, Design and Development of Information Systems, Data Management, Internet Applications.

Stefanos Karasavvidis

B.Sc. Technical University of Crete. M.Sc. Technical University of Crete.

Information Systems in Internet Applications.

Fotios Kazasis

B.Sc. University of Patras. M.Sc. Technical University of Crete.

Markos Kimionis

B.Sc. Technological Educational Institute of Crete.

Logic Design and Digital Systems.

Nathanail Kortsalioudakis

B.Sc. University of Crete. M.Sc. Ph.D. Technical University of Crete.

Optoelectronic Devices and Applications.

Ioannis Maragoudakis

B.Sc. Technical University of Crete. M.Sc. Technical University of Crete.

Programming Languages, Design and Development of Distributed Information Systems and Applications.

Nektarios Moumoutzis

B.Sc. University of Crete. M.Sc. Technical University of Crete.

Programming Languages and Information Systems Technology for Internet, Learning Support and Creativity.

Kyprianos Papadimitriou

B.Sc. Technical University of Crete. M.Sc. Technical University of Crete. Ph.D. Technical University of Crete.

Digital Material Systems, Computer Architecture, Reconfigurable Systems and Electronic Systems.

Nikolaos Pappas

B.Sc. Technical University of Crete. M.Sc. Technical University of Crete.

Design and Development of Information Systems and Applications, Learning Support Information Systems, Databases.

Amalia Sergaki

B.Sc. Aristotle University of Thessaloniki. M.Sc. International Centre for Advanced Mediterranean Agronomic Studies, France

Theory and Technology of High Voltage Circuits and Intelligent Decision Systems for Management of Renewable Energy Systems.

Eleftheria Sergaki

B.Sc. Aristotle University of Thessaloniki. M.Sc. Technical University of Crete, Ph.D. Technical University of Crete.

Applied Automatic Control and Energy Efficiency of Systems.

Euripides Sotiriadis

B.Sc. Technical University of Crete, M.Sc. Technical University of Crete. Ph.D. Technical University of Crete.

Study, Design, and Implementation of Computer Systems based on Microprocessors and Reconfigurable Logic.

Sophia Tsakiridou

B.Sc. Aristotle University of Thessaloniki. Ph.D. University of Vermont, USA.

Design, Modeling and Performance Analysis of Communication Systems and Networks.

Vassilios Tsiaras

B.Sc. Aristotle University of Thessaloniki. M.Sc. University of London, UK. Ph.D. University of Crete.

Mathematics, Applied Mathematics, Brain Signal Analysis.

Chrisi Tsinaraki

B.Sc. Technical University of Crete, MSc Technical University of Crete, PhD Technical University of Crete.

Knowledge representation, data analytics, information systems.

Laboratory Technical Staff

Spyridon Psychis

B.Sc. Technical University of Crete. M.Sc. Technical University of Crete.

Administrative Staff

Vassiliki Grigoraki

Head of the School Secretariat.

Laboratory Infrastructure

To support the educational process and the research work carried out at the School of Electrical and Computer Engineering, eleven (11) laboratories are currently in operation.

Automation Laboratory [www.systems.tuc.gr]

Director: Professor M. Zervakis

This laboratory serves the educational and research needs in the discipline of Systems Theory and Automatic Control.

Research areas: Automatic Control Theory. Intelligent Control. Industrial Controllers. Neural Networks. Automated Fault Diagnosis and Repair. Diagnostic Systems in Medicine. Biomedical Systems. Robotics. Robotic Applications in Medicine. Industrial Control Processes. Production System Scheduling.

Circuits, Sensors and Renewable Energy Sources Laboratory [www.elci.tuc.gr]

Director: Professor E. Koutroulis

The laboratory is active in the field of electric circuits and renewable energy sources. Its research equipment includes high-precision oscilloscopes, generators and multimeters, electric energy quality analyzer, meters of various environmental and electric parameters and development systems of microprocessors, DSPs and FPGAs.

Research areas: Sensors and electronic measurement systems. Development of local networks for interconnection of sensors, actuators and computers. Development of electronic control devices based on fuzzy logic and neural networks. Decision systems for industrial applications. Wind turbines systems. Applications of photovoltaic devices. Management and operation of electric power plants. Management and optimization in renewable energy systems. Intelligent energy management systems in buildings. Development of power electronic converters.

Digital Signal and Image Processing Laboratory [www.display.tuc.gr]

Director: Professor M. Zervakis

This laboratory conducts active research in applications related to the reception, identification, and diagnosis of operational problems in various signals used in Telecommunications, Industry, and Biomedicine.

Research areas: Biomedical image and signal processing. Machine vision and noninvasive diagnosis methods. Search methods in image and video archives. Video processing, analysis and compression. Nonlinear systems modeling using artificial intelligence methods. Neural networks and fuzzy logic systems. Time series processing.

Distributed Computing Systems and Applications Laboratory [www.music.tuc.gr]

Director: Professor A. Deligiannakis

The laboratory was founded in 1990. It is a research and development center in the areas of distributed computing systems, multimedia, graphics, human-computer interaction, and the systematic development of large-scale computer systems and business applications on the Internet.

Research areas: Information retrieval systems. Internet search engines and agent technologies. Digital libraries. Multimedia communication systems. Distributed collaboration and workflow management environments. Human-computer interaction. Applications in tourism and culture, e-commerce, e-learning. Office automation, company automation. Distributed multimedia information systems. Development of Internet applications and services. Information society. Databases. Three-dimensional computer graphics, simulation technologies, visualisation, medical applications.

Electric Power Systems Laboratory

Director: Associate Professor F. Kanellos

The laboratory is active in the area of high power and specifically in the fields of electrical engineering and power generation-transmission-distribution.

Research areas: Study of the operation of electric motors and generators, using experimental setups and software. Measurements and testing. Experimental study of the characteristics of power transformers. Measurements and tests. Electricity generation. In-depth study of modern methods of conventional and alternative generation using relevant experimental apparatus with measurements and tests. Study of power transmission and distribution systems using experimental models, simulation and modelling with software, conducting measurements, optimal operation, real-time control. Instruments for measuring power, energy, power factor, power quality and their interface with computer.

Electronics Laboratory [www.electronics.tuc.gr]

Director: Professor C. Balas

The laboratory's activities include research, development, training, and technology transfer in the fields of optoelectronics and micro-nano electronics. The Electronics Laboratory is equipped with tools for design, simulation, layout, prototyping, characterization and testing of optoelectronic and microelectronic systems and devices.

Research areas: Development of systems and data analysis of Super-Fascicle imaging data. Optical molecular imaging. Biophotonic medical diagnostic instruments. High-frequency microelectronics. Design and modeling of CMOS devices and circuits. Study, design and evaluation of very large-scale integration (VLSI) circuits. Optoelectronic devices and their applications. Development of optimal battery power management, voltage conversion and uninterruptible power supply (UPS) systems.

Information and Networks Laboratory [www.infonet.tuc.gr]

Director: Professor M. Paterakis

The laboratory is active in the areas of Communication Networks and Information and Code Theory with applications to Communication Networks.

Research areas: Design, modeling and performance analysis of computer communication networks. Wireless mobile networks of unified services. Integrated multicast telecommunication networks. High-speed, local and metropolitan area broadband networks. Centralized and distributed multimedia information distribution systems. Time-scheduling methods for multimedia servers and for data information transmission in wireless networks. Voice recognition. Voice coding. Acoustic and linguistic modeling. Intelligent speech recognition and adaptation. Telephony and web applications of speech recognition.

Intelligent Systems Programming and Technology Laboratory [www.intelligence.tuc.gr]

Director: Professor E. Petrakis

The laboratory was founded in 2001. The current research activities cover various topics in Artificial Intelligence, Intelligent Agents, Bioinformatics, Information Retrieval, Machine Learning, Multi-agent Systems, and Robotics. The laboratory equipment includes Sony Aibo quadruped robots and Aldebaran Nao bipedal humanoid robots that make up the "Kouretes" robotic soccer team.

Research areas: Artificial Intelligence. Artificial Intelligence. Constraint Satisfiability Problems. Logic Programming and Constraint Programming. Logic reasoning and constraints. Information Systems on the Internet. Information Retrieval. Electronic Commerce. Semantic Internet. Autonomous Agents. Multi-Agent Systems. Game Theory. Machine Learning. Robotics. Bioinformatics. Machine Vision. Pattern Recognition. Image understanding.

Microprocessor and Hardware Laboratory [www.mhl.tuc.gr]

Director: Associate Professor S. Joannidis

The laboratory was established in 1990. Its activities revolve around computer architecture and hardware and embedded systems. The laboratory is fully equipped with laboratory instruments (oscilloscopes, logic analyzers, etc.) and dozens of systems for the development of digital circuits and/or embedded devices based on reconfigurable logic, as well as four of the largest supercomputing systems available worldwide based on a combination of multicore processors and reconfigurable logic (FPGA) circuits. The laboratory is a member of the EUROPRACTICE academic and research consortium.

Research areas: Computer systems architecture and hardware. Reconfigurable and embedded systems. Design and implementation of efficient systems (high performance, low cost, low power, etc.). Accelerating applications with specialized architectures. Development of computer-aided design (CAD) tools. Design and programming of parallel systems.

Software Systems Technology and Network Applications Laboratory [www.softnet.tuc.gr]

Director: Professor M. Garofalakis

The laboratory is a center for research and teaching of software systems technologies and network applications. The research and teaching activities of the laboratory include functional and distributed systems, sensor network systems, continuous data streams, large and distributed databases, and algorithms and complexity issues.

Research areas: Internet Content Collection and Distribution. Video streaming on the Internet. Cooperative Caching. Peer-to-peer architectures for large-scale content storage and distribution. Intelligent information storage systems. Device performance modeling. Storage and prefetching in hierarchical servers. Time-scheduling of access requests. Distributed information management systems (storage, prefetching, replica management, fault tolerance, recovery, etc.). File management systems. Database systems. Development of applications for electronic commerce.

Telecommunications Laboratory [www.telecomlab.tuc.gr]

Director: Professor A. Liavas

This laboratory conducts active research in telecommunications.

Research areas: Signal processing using convex optimization techniques. Optimization theory. Parallel numerical algorithms. Multidimensional harmonic parameter retrieval, direction finding and lobe shaping in multiple transmit-receive antenna systems. Node position estimation in sensor networks. Medium access protocols, queuing interaction and stability. Unique composition theory. Transceiver design, decoding, modeling and interference characterization in multi-line digital subscriber loop systems. Channel capacity. Design of DS-CDMA codes with parallel development and use of Welch-type blocks. Design of DS-CDMA receivers. Channel estimation and equalization. Development and implementation of optimization algorithms in parallel architectures.

Telecommunication Systems Institute

At the Technical University of Crete, the operation of the Telecommunication Systems University Research Institute [www.tsi.gr] has been established. The aim of the Institute is to conduct basic and applied research in the areas of Science and Technology of Telecommunications and of Telecommunication Systems, educate graduate students to obtain Master's and Doctoral Degrees in the broader area of Telecommunications, and conduct studies, produce products, and offer services in the areas of its activities.

Enrolment at the School of ECE

Incoming Student Registration

The way students are admitted to the ECE School, the number of admitted students per year, as well as the registration dates of new students are regulated by the Ministry of Education and Religious Affairs and current legislation. Detailed information on new students and their registration at the ECE School is available on the School's website, as well as on the main website of the Technical University of Crete.

Placement Examinations

Graduates of other Higher Education Institutions, Two-Year Schools or equivalent, may enrol in the ECE School of the Technical University of Crete, after they have successfully participated to qualifying exams related to specific courses of the School which are announced at the end of the spring semester of each academic year. Applications for participation are accepted in the first fortnight of November of each academic year and the qualifying exams are held in the first twenty days of December.

Attestations and Certificates

Every student, immediately after registering and submitting the appropriate application to the "Academic Identity" online service of the Ministry of Education and Culture [academicid.minedu.gov.gr], is provided with a personal Academic Identity for multiple uses.

At the request of the interested parties, the Student Service Center (SSC) of the Technical University of Crete may issue certificates in Greek or English for any legal use. These include the certificate of attendance (certifies that the student is enrolled in a semester of studies at the School), the certificate of studies (for the tax office or recruitment), the certificate of detailed score (list of courses completed by the student and his score), the diploma supplement and the certificate of completion of studies (certifies that the student has fulfilled all the obligations for obtaining a diploma).

Student Status

Student status is acquired upon initial registration at the ECE School, is maintained upon registration and declaration of courses in each semester of study, and is revoked upon the declaration and receipt of the Engineering Diploma. ECE School students are considered full-time students. As an exception, students who have evidence of working at least 20 hours a week may register as part-time students, following their application, which is approved by the Dean's Office of the School.

The student has the right to interrupt his studies for a maximum of four (4) whole semesters, consecutive or not, if there is a reason, with his written request before the start of the interrupted semester. These semesters are not counted in the duration of studies, however, the validity of the student status also ceases throughout the period of interruption of studies. Student status is restored in the semester following the end of the interruption with the student's return to the School.

Student Support

Students receive a variety of support, ranging from free textbooks, to subsidized tickets and meal and accommodation support.

• Through the central service "Eudoxus" of the Ministry of Education [eudoxus.gr], the student can select and receive free textbooks for the courses in which he is enrolled. The maximum number of free books that each student is entitled to during their studies is equal to the minimum

number of courses required to receive a diploma according to the regular curriculum. The same service also provides the possibility of exchanging books between students.

- The personal Academic ID, issued through the "Academic Identity" service of the Ministry of Education and Culture [academicid.minedu.gov.gr], serves as a special travel ticket (pass), which allows the granting of a reduced (student) ticket prices in public transport to facilitate the student's movements.
- Students can also claim free meals in the student club and/or free housing in the student residence of the Technical University of Crete, if they meet the necessary conditions, based on their individual and family financial situation and their locality.
- Students who do not have medical and hospital care are entitled to full medical and hospital care in the National Health System (NHS).
- Students can be supported financially during their studies through merit scholarships and excellence awards, bursaries, and interest-free education loans.
- Finally, the School provides counseling services to students for their smooth transition to higher education, dealing with difficulties in completing their studies, and supporting people with special needs. There are also selected professors who act as Study Advisors and guide and provide advice to students for the progress and successful completion of their studies. The Technical University of Crete also has a dedicated Counseling and Psychological Support Office that helps students effectively deal with any problems that may arise during their student life.

Curriculum Structure

The academic year begins on September 1st of each year and ends on August 31st of the following year. The curriculum of each academic year is divided into two semesters, fall and spring. The undergraduate studies (first cycle) at the School last a total of five (5) years or otherwise ten (10) semesters, which include the work on a diploma thesis. The 1st year of studies includes the 1st and 2nd semesters, the 2nd year of study in the 3rd and 4th semester, and so on.

Each semester includes at least thirteen (13) weeks of classes. If, for any reason, the number of weeks completed in any course is less than (13) then the corresponding course becomes and is considered equivalent to not having been offered.

The holidays in the academic year are as follows.

a. Fall Semester

- October 28 (anniversary of Greece's entry into the WWII)
- November 17 (anniversary of the 1973 student unrest in Athens)
- November 21 (the annunciation of Virgin Mary patron Saint of Chania)
- December 24 to January 6 (Christmas and New Year's Holidays 2 weeks)

b. Spring Semester

- Lenten Monday (the beginning of the Great Lent before Easter)
- March 25 (Greece's Independence Day)
- The Holy Week and the Bright Week (Easter vacation 2 weeks)
- May 1 (Labor Day)
- Student elections day (determined by the federation of student unions)
- Monday following the Pentecost

The courses offered by the ECE School are semester-long and include

- lectures in class,
- tutorials and exercises,
- · teaching labs,
- practical training of the students,
- seminars or other activities which are deemed necessary for the better coverage of the material.

The detailed curriculum of the ECE School is updated as needed at the end of the spring semester of each academic year and applies as of the following academic year. The curriculum entails

- the titles of all courses,
- the organization of courses in semesters of study,
- the number of credit units (ECTS) for each course,
- the number of hours per week for lectures, tutorials, and laboratories for each course,
- the recommended prerequisites for each course,
- a detailed description of topics covered in each course.

Coursework is divided in two categories: (a) core or compulsory courses, and (b) elective or optional courses. The first category includes courses that provide the fundamental core knowledge to the students; all of them must be completed successfully. The second category includes many courses on specialized topics; the student must choose and complete successfully a sufficient number of elective courses to meet the graduation requirements. The second category also includes foreign-language courses, where participation of foreign students of the Erasmus program is possible, and gives the opportunity for the local students to become familiar with international terminology. However, it is not allowed to choose a foreign-language course if the student has already succeeded in the corresponding Greek language course, and vice versa.

The recommended ordering of courses given in the curriculum and their organization in semesters is indicative and not mandated. Nonetheless, it corresponds to a nominal flow under normal study conditions, it accounts for the minimum number of semesters towards graduation, and it considers the recommended prerequisite courses for each course. This ordering constitutes the Nominal Curriculum in the ECE School, and it secures the most natural and recommended schedule of course registration that facilitates the completion of the entire program of studies in the ECE School within the nominal duration of five (5) years.

Course Registration and Attendance

Each student in each semester is obliged, within a period and in a manner defined and announced by the School Secretariat, to register to the courses he wishes to attend during the semester. The Secretariat checks the validity of registration applications and compiles the lists of registered students for each course. Students cannot attend a course or be tested in it if they do not include it in their application. Late registrations are approved for a limited number of registered courses only in justified cases. The registration process is necessary each semester to maintain student status.

In each semester of studies, each student can register to the courses she/he wishes (from the current, but also from junior or senior semesters), without, however, exceeding ten (10) courses for full study or five (5) courses for partial study.

It is pointed out that the student cannot register to more than two (2) courses of higher semesters than the one the student is at. Also, it is not allowed to register to compulsory upper-semester courses, if the

student has not successfully completed the necessary prerequisite compulsory courses of lower semesters, according to the regular curriculum of the School. The necessary prerequisite courses are listed below in the tables with the School's detailed curriculum.

Advanced undergraduate students may also enroll in graduate courses, taught in the same semester, upon permission of the course instructor. After the successful completion of a graduate course and upon approval by the School Assembly, the course is counted as an optional course towards the requirements for obtaining the undergraduate degree. A maximum of two (2) graduate courses can be counted in this way.

In the event that a student is enrolled in a course, but has not satisfactorily met the requirements for passing the course, and that course is (a) dropped from the curriculum, (b) replaced by another equivalent course, or (c) not taught for a certain period of time, the student is obliged to complete the corresponding credit units (ECTS) from another compulsory or elective compulsory course of the same or related subject, in accordance with the relevant decision of the Assembly and the corresponding transitional provisions. Also, students have the possibility to choose and complete new elective courses that are introduced into the curriculum after their year of admission and are taught during their studies at the ECE School.

A very good knowledge of English is absolutely necessary for attending the School's courses, given that most of the relevant literature is in English, but also because for much of the terminology there is no generally accepted corresponding Greek terminology.

The teaching of ECE School courses is supported by the eclass.tuc.gr e-learning platform which is an integrated online information system for course management, support for educational processes, provision of auxiliary materials, and online training applications.

Course Grading

The successful attendance of a course during the semester and the final performance in it are judged among others by: the participation in lectures, the preparation and delivery of exercises, assignments, laboratory exercises, and any oral examination thereof, the possible preliminary written exams (progresses) and the final written exam, depending on the particular educational requirements of each course. The rating in each course is determined by the instructor, who can organize written or oral exams at his discretion or rely on projects or laboratory exercises.

Students have the possibility to participate in two (2) examination periods for each semester of study, the normal and the repeat. For each semester of studies, the normal examination is held immediately after the end of the semester exclusively for the courses taught during the semester in question. The repeat examination is conducted before the start of the next academic year for all courses taught in the two semesters (fall and spring) of the current academic year. Students who do not meet the passing requirements for a course after the two examination periods (regular and retake), must re-enroll in the course and follow all monitoring and examination procedures from the beginning in the next semester in which the course is taught.

The grade in all the School's courses is expressed on a scale of 0 (zero) to 10 (ten), including the use of the fractional part (only in multiples of half a grade - 0.5) and based on a passing grade of 5 (five), with the exception of the elective courses ECE 311, ECE 312, ECE 411 and ECE 412 which are graded as Pass or Fail and are not counted in the calculation of the degree and graduation requirements.

Transfer of Coursework

It is possible only for students enrolled in the ECE School's undergraduate program through transfer from another university, or placement examinations, to transfer coursework from other universities and count

it towards their graduation from the ECE School. To do so, the following conditions must be met.

- The student must have successfully completed the course he/she wants to transfer in a different School of the Technical University of Crete or in another university in Greece or abroad.
- The School Assembly, in cooperation with the corresponding instructor, determines the equivalence of the course material of the requested course to the material of the corresponding course in the ECE curriculum, as described in the Undergraduate Studies Guide.
- In case of equivalence, the credit hours of the equivalent ECE course are credited to the student. If this course was taken at a Greek university the grade is transferred as well. However, if the recognized course was taken at a university abroad, the student gets credited with the corresponding credit hours, but the grade is not transferred. In such cases, the annual grade and the final diploma grade of the student are calculated only from courses with grades.
- In cases of nonequivalence, the Undergraduate Studies Committee makes a recommendation to the General Assembly, which takes a final decision for the recognition or not of the requested course.

Regarding the first two English courses (English I and II), students who are certified at C2 level according to the Common European Framework of Reference for Languages may bring a certified copy of their diploma at the beginning of the semester at the Language Research and Resources Center to automatically receive a grade of 8,0 without examination. In particular, with a Proficiency diploma, they can get a grade 8 in the ENG 101, ENG 102 courses, whereas with a Advanced diploma, a grade of 7 in ENG 101, ENG 102 and finally with a Lower Diploma a grade of 5 only in ENG 101 course.

Diploma Thesis

All students are required to complete a Diploma Thesis, which includes a substantial amount of work and a final written report on a well—defined project related to the scientific subjects of the ECE School. The diploma thesis is completed under the supervision of one or more faculty members of the School, who act as the student's advisor. The General Assembly of the School has determined the following.

- Thesis topics are assigned exclusively by the professors of the School of ECE who periodically announce proposed topics. The students must come to an agreement with the corresponding professor to take on a subject. The thesis supervising professor must necessarily be a professor of the ECE School.
- Immediately after finding a subject and a supervising professor, the student applies for thesis assignment approval by the Faculty Assembly. The thesis is usually assigned during the last two semesters studies (9th and 10th).
- The three-member thesis committee is proposed by the supervising professor and assigned by the Assembly. In addition to the supervising professor, other professors of the School participate in the committee. On a case-by-case basis, if the subject of the work requires it, up to one of the three committee members can be a Laboratory Teaching Staff member of the ECE School or an external scientist (indicatively, professor or designated assistant professor or designated lecturer or researcher of a recognized academic or research institution in Greece or abroad or industry executive), as long as he holds a Doctorate Degree.
- Students that are unable to identify a thesis topic in direct consultation with professors of the School and owe a maximum of one (1) compulsory and a maximum of two (2) electives compulsory courses for the completion of the study program may address their request to the School Assembly which must proceed to finding and assigning a suitable subject and a supervisor within one month of the filing of the application. The latter procedure is decided by the School Assembly and is communicated to the undergraduate students of the School via the School's

undergraduate study guide and its website.

- The presentation and examination of the thesis is allowed only after completion of the student's obligations regarding the courses of the study program that are required to obtain a diploma and only after at least five (5) months from the thesis assignment by the Assembly.
- Following its completion, the diploma thesis is presented to open audience and is graded by the three-member examination committee. The presentation of a diploma thesis can be done anytime throughout the academic year, except for the vacation periods. In all cases, the presentation of the thesis must take place within twenty (20) days of the completion of some examination period for receiving the diploma degree in the graduation that follows that examination period. The exact date and time of the oral presentation is determined in cooperation with the members of the three-member examination committee.
- The exact date, time and place of thesis presentation and examination are determined in consultation with the three-member committee that grades the work and are publicly announced together with the title and abstract of the work to all members of the School and the Technical University of Crete.
- Each diploma thesis is graded in the 0-10 scale by taking the average of the grades given by the three committee members to each of the following three criteria with the corresponding percentages: quality of technical content (50%), quality of written report (30%), and quality of oral presentation (20%).
- In case of collaborative work among two or more students, which is allowed only following the approval of the School's General Assembly, each student is graded separately for his/her contribution to the diploma thesis and his/her oral presentation.

Internships and Educational Trips

In the context of the corresponding elective compulsory courses of the 3rd or 4th year, students can be employed as interns in public or private institutions for practical training as well as participate in educational trips that include visits to companies and industries to gain experience.

The internship [atlas.grnet.gr] gives students the opportunity to get to know the working environment up close and to be rewarded for the services they offer. There is often external funding for internships in Greece (e.g. through the NSRF program "Tertiary Education Internship of the TUC" for internships in industries, services, and organizations) or in the European Union (e.g., through the Erasmus+ program).

For more information, interested parties can visit https://www.tuc.gr/index.php?id=1853.

The educational trips last up to one week and take place during the period defined by the academic calendar and only if the percentage of student participation is significant.

More information about the Career Services Office can be found at www.career.tuc.gr.

Graduation Requirements

The requirements for graduating and receiving the Engineer's Diploma are as follows.

- Enrollment in the School and attendance of courses for at least ten (10) semesters of study, for students who enroll normally (with entrance exams).
- Successful completion of forty-nine (49) courses in total, i.e. thirty-three (33) compulsory courses and sixteen (16) optional compulsory courses (with certain restrictions given in the detailed curriculum below).
- Completion of at least 300 Credit Units (ECTS).
- Successful completion of a diploma thesis.

Grade and Characterization of Diploma

The diploma grade is calculated from the average of the grades of all courses required to obtain the diploma with a weight of 80% and from the grade of the diploma thesis with a weight of 20%. To calculate the course grade point average, each course grade is multiplied by the course weight and the sum of the individual products is divided by the sum of all course weights. English I, II, III do not count towards the degree. The weights are calculated according to the credits of each course, as shown in the table below.

WEIGHTS OF CREDIT UNITS

| Credit Units | 1 – 2 | 3 – 4 | 5 or more |
|--------------|-------|-------|-----------|
| Weight | 0,50 | 0,75 | 1,00 |

If a student has successfully completed more courses than the minimum number of courses required to obtain the diploma, the elective compulsory courses with the lowest passing grades are not counted towards the derivation of the final diploma grade, provided that all are fully satisfied the requirements for receiving a diploma from the remaining courses. However, all courses and corresponding grades are listed on the student's transcript.

The qualification of the diploma, depending on the final grade, is as follows.

CATEGORIES OF DEGREE CHARACTERIZATION

| Good | grade from 5.0 to 6.5 | (not including 6.5) |
|-----------|-----------------------|---------------------|
| Very Good | grade from 6.5 to 8.5 | (not including 8.5) |
| Excellent | grade from 8.5 to 10 | |

The student graduation list is compiled each September, after the re-examination period, and includes students who obtained their diploma either during the winter or spring semester of the current academic year, or immediately after the September re-examination. The classification is based on the degree of their diploma, regardless of the date of their first registration. The order of success (annual and graduation) is used to award scholarships, honors, etc.

Annual Grade and Ranking

The annual grade of a student is the average grade over the courses he/she completed successfully in the past academic year. The annual grade is calculated only for students who have completed successfully all courses of the nominal curriculum in the two semesters of the past academic year. The calculation is like the one for the final grade of the diploma (multiplication of each course grade with the corresponding weight coefficient, summation of the partial products, and division by the sum of all weight coefficients), however only the core and elective courses of the nominal curriculum in the past academic year count. Additional courses, which may have been completed successfully by the student, as well as English I, II, and III are not considered.

The annual rankings are determined each September, following the second examination period, separately for the students of each of the five (5) years of studies who successfully completed all coursework in the nominal curriculum up to their year of study. For the first four (4) years in the program, following a student's initial registration, the year of studies is considered to be the corresponding academic year. Beyond the fourth year, all students are considered to be in the fifth year of studies. The annual rankings are used for the award of scholarships, honors, etc.

Learning Outcomes of the Undergraduate Studies Program in ECE

The scientific subject of Electrical and Computer Engineering is very broad, including, indicatively, the fields of Informatics, Electronics and Computer Architecture, Telecommunications, Electrical Energy Systems, and Automatic Control Systems.

The ECE School's Undergraduate Studies Program covers extensively the above subjects via a combination of compulsory and elective courses. These courses build on the basic knowledge of Mathematics, Physics, and Programming, provided in the first years of studies, and cover both in breadth and depth the scientific subject of ECE.

Beyond the education fundamentals, an important goal of the ECE School is the exposure of students to research. This is accomplished through the teaching of highly specialized and modern subjects (e.g., Biotechnology, Machine Learning – Big Data, Reconfigurable Systems, Wireless Communications, VLSI Systems, Optoelectronics, Parallel and Distributed Computing and Algorithms, Information Theory and Coding, etc.).

The graduates of the ECE School (1) continue for graduate or Doctoral studies at universities in Greece or abroad, (2) are employed in high-tech companies, (3) create start-up companies, (4) work in public services, and (5) work as freelancers.

In particular, the ECE School's undergraduate studies program is divided into three main sections with corresponding learning outcomes:

General background courses (Foundations of the basic sciences and arts): This category contains courses in Mathematics (Single and Multivariate Calculus, Linear Algebra, Probability Theory and Stochastic Processes, Differential Equations, Numerical Analysis, etc.), Physics (Mechanics, Electromagnetism), and Social Sciences (Sociology, Political Economy, etc.). Successful completion of these modules guarantees that students have a thorough understanding of the fundamentals of the Natural Sciences (Mathematics, Physics) and Social Sciences, which are necessary to engage in the scientific subject of Electrical and Computer Engineering.

Special background courses: The scientific subject of Electrical and Computer Engineering is very broad. Particular emphasis is placed on the complete coverage of fundamental knowledge in the scientific areas of Computer Science (Programming Languages, Data Structures, Operating Systems, Databases, Algorithms and Complexity), Electronics (Circuit Theory and Analysis, Electronics), Computer Architecture (Logical Design, Digital Computers, Computer Organization), Telecommunications (Digital Communications, Signal Processing, Computer Networks), and Systems (Electric Power Systems, Automatic Control Systems). The successful completion of these modules provides the solid scientific foundation to the students that is necessary for the advancing to more specialized areas and courses.

Specialized advanced courses: The third category of courses is taught after the third year and, building on the fundamental knowledge acquired via the basic subjects of ECE, aims to enable students to delve into specialized modern research topics. Indicatively, we mention the areas in which the students specialize in our School: Optoelectronics, Biotechnology, Parallel and Distributed Systems, Machine Learning, Reconfigurable Systems, Information Theory and Coding, Convex Optimization, Renewable Energy Sources. Successful completion of these modules equips students to carry out independent and original work in their areas of interest.

Finally, the Diploma Thesis enables students to synthesize the knowledge obtained from the study program into a comprehensive work that combines literature reviewing and/or research components. The work concludes with the writing of a complete and independent scientific text. Occasionally, the content of Diploma Theses is published in international research journals and/or presented at international scientific conferences.

Upon completion of the study program, the graduates of our ECE School are well positioned to:

- 1. fill positions of responsibility in high-tech companies and public services
- 2. work as freelancers and offer technology services
- 3. undertake teaching work at various levels of the education system locally and abroad
- 4. provide technical and professional training, at a theoretical and applied level
- 5. participate in research projects in public and private research centers
- 6. define, plan, analyze and study technological projects
- 7. use modern IT tools, software and engineering techniques
- 8. organize, supervise and direct technological projects
- 9. apply knowledge of mathematics, science, informatics, engineering to different areas
- 10. compose, organize and manage interdisciplinary teams
- 11. understand issues of professional and ethical responsibility
- 12. communicate and present technological data accurately
- 13. understand the importance and role of technological projects in global development

Detailed Study Program

Subject Areas of the Courses

The courses of the School of ECE are divided into eight (8) scientific areas.

1. Electronics and Computer Architecture [ECA]

This area covers topics related to the design, implementation, and analysis of analog and digital electrical, electronic systems.

2. Systems [SYS]

This area covers topics related to systems theory (automatic and optimal control, neural networks, fuzzy logic) and their applications (biomedicine, quality control).

3. Telecommunications [TEL]

This area covers topics related to telecommunication systems (telephone, network, wireless) and information processing (sound, voice, image, data).

4. Informatics [INF]

This area covers topics related to basic principles of information technology (programming, operating systems, databases, algorithms, software engineering).

5. Energy Systems [ENE]

This area covers knowledge of conventional and modern energy production, storage, distribution, and management systems.

6. ECE Science [ECE]

This area covers topics related to the scientific subject of electrical and computer engineering, through seminar courses, internships, etc.

7. Mathematics [MTH]

This area covers topics related to basic and advanced mathematics for engineers.

8. Physics [PHY]

This area covers topics related to physics for engineers.

Courses offered by academic units outside the School of ECE are classified in the following areas.

1. Chemistry [CHE]

This area covers topics related to chemistry for engineers.

2. Society, Science, Culture [SOC]

This area covers topics related to humanities subjects.

3. Production and Management [PEM]

This area covers topics related to production and management, industrial design, and computer-aided

design. It is part of the School of Production and Management Engineering.

4. English Language [ENG]

This area covers the oral and written use of English language. It is part of the Language Center.

5. Chinese Language [CHN]

This area covers the oral and written use of Chinese language. It is part of the Language Center.

Course Numbering

For easy reference, the courses in the School of ECE have been coded as follows.

- The abbreviation of the subject area precedes the abbreviation followed by a three-digit numerical code
- The first digit indicates the year of study to which the course corresponds
- The second digit is 0 for compulsory courses and 1 or 2 for optional courses
- The third digit is the serial number of the course in the corresponding area

Curriculum Structure

The following summary tables list all the courses in the curriculum by semester. For each course, the title, the code, the credit units (ECTS), the weekly hours of lectures (Lec), the weekly hours of recitation (Rec), the weekly hours of laboratory (Lab), the necessary prerequisite courses, and the recommended prerequisite courses are noted. The following is information on the courses from which the student can choose during his/her studies, as well as some restrictions on their choice.

1st Semester

Compulsory

| Title | Code | ECTS | Lec | Rec | Lab | Necessary Prerequisite | Recommended Prerequisite |
|-----------------------------|---------|------|-----|-----|-----|---------------------------|-----------------------------|
| Logic Design | ECA 101 | 6 | 3 | 1 | 2 | - | - |
| Introduction to Programming | INF 101 | 6 | 3 | 1 | 2 | - | - |
| Single-Variable Calculus | MTH 101 | 6 | 4 | 1 | 1 | - | - |
| Linear Algebra | MTH 102 | 6 | 3 | 1 | - | - | - |
| English I | ENG 101 | 4 | 4 | - | - | - | - |

Elective

| Title | Code | ECTS | Lec | Rec | Lab | Necessary Prerequisite | Recommended Prerequisite |
|-----------------------|---------|------|-----|-----|-----|---------------------------|-----------------------------|
| Discrete Mathematics | MTH 111 | 5 | 3 | - | - | - | - |
| Physics I - Mechanics | PHY 111 | 5 | 3 | 1 | 1 | - | - |
| General Chemistry | CHE 111 | 5 | 3 | - | - | - | - |

2nd Semester

Compulsory

| Title | Code | ECTS | Lec | Rec | Lab | Necessary Prerequisite | Recommended Prerequisite |
|-------------------------------|---------|------|-----|-----|-----|---------------------------|-----------------------------|
| Object-Oriented Programming | INF 102 | 6 | 3 | 1 | 2 | - | INF 101 |
| Multivariable Calculus | MTH 103 | 6 | 4 | 2 | - | - | MTH 101 |
| Math Elements for ECE | MTH 104 | 6 | 4 | 2 | - | - | MTH 101 |
| Physics II - Electromagnetism | PHY 101 | 6 | 3 | 1 | 2 | - | MTH 101 PHY 111 |
| English II | ENG 102 | 4 | 4 | - | - | - | ENG 101 |

| Title | Code | ECTS | Lec | Rec | Lab | Necessary Prerequisite | Recommended Prerequisite |
|--------------------|---------|------|-----|-----|-----|---------------------------|-----------------------------|
| Numerical Analysis | MTH 112 | 5 | 3 | 1 | - | - | MTH 102 |

3rd Semester

Compulsory

| Title | Code | ECTS | Lec | Rec | Lab | Necessary Prerequisite | Recommended Prerequisite |
|---------------------------|---------|------|-----|-----|-----|---------------------------|--|
| Basic Circuit Theory | ECA 201 | 6 | 2 | 2 | 2 | MTH 104 | MTH 101 |
| Digital Computing Systems | ECA 202 | 6 | 3 | 2 | 2 | ECA 101 | INF 101 INF 102 |
| Signals and Systems | TEL 201 | 6 | 3 | 2 | 1 | MTH 101 or MTH 103 | INF 101 MTH 101 MTH 102 MTH 103 |
| Probability Theory | MTH 201 | 6 | 3 | 2 | 1 | MTH 101 or MTH 103 | MTH 101 MTH 103 |
| English III | ENG 201 | 4 | 4 | - | - | - | ENG 102 |

Elective

| Title | Code | ECTS | Lec | Rec | Lab | Necessary Prerequisite | Recommended Prerequisite |
|---|---------|------|-----|-----|-----|---------------------------|-----------------------------|
| Software Development Tools and System Programming | INF 211 | 5 | 3 | 1 | 2 | - | INF 102 |

4th Semester

Compulsory

| Title | Code | ECTS | Lec | Rec | Lab | Necessary Prerequisite | Recommended Prerequisite |
|--------------------------------|---------|------|-----|-----|-----|---------------------------|-----------------------------|
| Analysis of Electric Circuits | ECA 203 | 6 | 2 | 2 | 2 | PHY 101 or ECA 201 | PHY 101 ECA 201 |
| Electronics I | ECA 204 | 6 | 3 | 2 | 2 | - | ACE 201 |
| Data Structures and Algorithms | INF 201 | 6 | 3 | 2 | 2 | INF 102 | INF 101 |
| Control Systems | SYS 201 | 6 | 3 | 1 | 2 | MTH 102 | MTH 104 |
| English IV | ENG 202 | 4 | 4 | 1 | 1 | - | ENG 201 |

| Title | Code | ECTS | Lec | Rec | Lab | Necessary Prerequisite | Recommended Prerequisite |
|---|---------|------|-----|-----|-----|---------------------------|-------------------------------|
| Electronic - Electrotechnical Materials | ECA 211 | 5 | 3 | 2 | 1 | - | PHY 111 PHY 101 |
| Propagation of Electromagnetic Waves and Elements of Antennas | TEL 211 | 5 | 3 | 1 | 1 | - | MTH 102 PHY 111 |
| Differential Equations | MTH 211 | 5 | 3 | - | 1 | - | MTH 102 MTH 103 MTH 104 |
| Mathematical Biology | MTH 212 | 5 | 3 | - | - | - | MTH 102 MTH 103 MTH 104 |

Compulsory

| Title | Code | ECTS | Lec | Rec | Lab | Necessary Prerequisite | Recommended Prerequisite |
|---|---------|------|-----|-----|-----|---------------------------|-----------------------------|
| Electronics II | ECA 301 | 6 | 3 | 2 | 2 | ECA 204 | SYS 201 |
| Operating Systems | INF 301 | 6 | 3 | 1 | 2 | INF 101 | - |
| Design and Development of Information Systems | INF 302 | 6 | 3 | 1 | 2 | INF 102 | INF 101 INF 211 |
| Digital Signal Processing | TEL 301 | 6 | 3 | 1 | 2 | TEL 201 or MTH 104 | TEL 201 MTH 104 |

Elective

| Title | Code | ECTS | Lec | Rec | Lab | Necessary Prerequisite | Recommended Prerequisite |
|-----------------------------------|---------|------|-----|-----|-----|---------------------------|-----------------------------|
| Introduction to Quantum Computers | MTH 311 | 5 | 3 | 1 | - | - | MTH 102 MTH 111 |
| Simulation | PEM 311 | 5 | 4 | - | 2 | - | - |
| Sociology | SOC 311 | 5 | 3 | - | - | - | - |
| Philosophy and History of Science | SOC 312 | 5 | 3 | - | - | - | - |
| Art and Technology | SOC 313 | 5 | 3 | - | - | - | - |
| Chinese I | CHN 311 | 3 | 2 | 2 | - | - | - |

6th Semester

Compulsory

| Title | Code | ECTS | Lec | Rec | Lab | Necessary Prerequisite | Recommended Prerequisite |
|-----------------------------|---------|------|-----|-----|-----|---------------------------|-------------------------------|
| Electric Power Systems I | ENE 301 | 6 | 3 | 1 | 2 | ECA 203 | MTH 103 PHY 101 |
| Computer Organization | ECA 302 | 6 | 3 | 2 | 2 | ECA 202 | INF 102 |
| Databases | INF 303 | 6 | 3 | 2 | 1 | INF 102 | INF 201 INF 301 |
| Telecommunication Systems I | TEL 302 | 6 | 4 | 1 | 1 | TEL 201 or MTH 201 | MTH 103 TEL 201 MTH 201 |

| Title | Code | ECTS | Lec | Rec | Lab | Necessary Prerequisite | Recommended Prerequisite |
|--|---------|------|-----|-----|-----|---------------------------|-----------------------------|
| Artificial Intelligence | INF 311 | 5 | 3 | 1 | 2 | - | INF 201 INF 211 |
| Statistical Modeling and Pattern Recognition | TEL 311 | 5 | 5 | 3 | 2 | - | MTH 103 |
| Quantum Technology | PHY 311 | 5 | 3 | 1 | 1 | - | MTH 311 |
| Applied Mathematics | MTH 312 | 5 | 3 | - | - | - | MTH 101 MTH 102 |
| Political Economy | SOC 314 | 5 | 3 | - | - | - | - |

| Introduction to Philosophy | SOC 315 | 5 | 3 | - | - | - | - |
|----------------------------|---------|---|---|---|---|---|---|
| History of Civilization | SOC 316 | 5 | 3 | - | - | - | - |
| Practical Training I | ECE 311 | 5 | - | - | - | - | - |
| Field Trips | ECE 312 | - | - | - | - | - | - |
| Chinese II | CHN 312 | 3 | 2 | 2 | - | - | - |

Compulsory

| Title | Code | ECTS | Lec | Rec | Lab | Necessary Prerequisite | Recommended Prerequisite |
|------------------------------|---------|------|-----|-----|-----|---------------------------|-----------------------------|
| Electric Power Systems II | ENE 401 | 6 | 3 | 1 | 2 | ECA 203 | - |
| Algorithms and Complexity | INF 401 | 6 | 3 | 3 | - | INF 201 | - |
| Telecommunication Systems II | TEL 401 | 6 | 3 | 2 | 2 | TEL 201 | TEL 201 TEL 302 |
| Computer Networks I | TEL 402 | 6 | 3 | 1 | 2 | MTH 201 | - |

| Title | Code | ECTS | Lec | Rec | Lab | Necessary Prerequisite | Recommended Prerequisite |
|--|---------|------|-----|-----|-----|---------------------------|--|
| Microprocessor-based Embedded Systems | ECA 411 | 5 | 3 | 2 | 2 | - | ECA 302 INF 301 |
| Optoelectronics | ECA 412 | 5 | 3 | - | 3 | - | ECA 301 |
| Security of Systems and Services | ECA 413 | 5 | 3 | 2 | 1 | - | ECA 202 INF 301 INF 303 TEL 402 |
| Electrical Machines | ENE 413 | 5 | 2 | 2 | 2 | - | ENE 301 ENE 401 |
| Principles of Programming Languages | INF 411 | 5 | 3 | 1 | 2 | - | INF 201 |
| Autonomous Agents | INF 412 | 5 | 3 | 1 | 2 | - | INF 311 |
| Human-Computer Communication | INF 413 | 5 | 3 | 1 | 2 | - | INF 302 |
| Linear Systems | SYS 411 | 5 | 3 | 1 | 1 | - | SYS 201 |
| Digital Image Processing | TEL 411 | 5 | 3 | 1 | 2 | - | - |
| Analysis and Design (Synthesis) of Telecommunication Devices | TEL 413 | 5 | 2 | ı | 3 | - | TEL 201 ECA 203 INF 102 |
| Optimization | TEL 414 | 5 | 3 | 1 | 1 | - | MTH 102 |
| Wireless Communiations | TEL 415 | 5 | 3 | 1 | 1 | - | TEL 302 |
| Tensors: Theory-Applications | MTH 411 | 5 | 3 | 1 | 1 | - | MTH 102 MTH 201 |
| Micro- and Macro-Economic Analysis | SOC 411 | 5 | 3 | ı | 1 | - | - |
| Practical Training II | ECE 411 | 5 | 1 | - | - | - | - |
| Chinese III | CHN 411 | 3 | 2 | 2 | - | - | - |

Compulsory

| Title | Code | ECTS | Lec | Rec | Lab | Necessary Prerequisite | Recommended Prerequisite |
|-----------------------|---------|------|-----|-----|-----|---------------------------|-----------------------------|
| Theory of Computation | INF 402 | 6 | 3 | 2 | 1 | - | INF 401 |

| Elective | | | | | | Necessary | Recommended |
|--|---------|------|-----|-----|-----|--------------|-------------------------------|
| Title | Code | ECTS | Lec | Rec | Lab | Prerequisite | Prerequisite |
| Electricity Transmission and Distribution Systems | ENE 411 | 5 | 3 | 1 | 2 | - | ENE 301 ENE 401 |
| Design of Electrical Installations | ENE 412 | 5 | 3 | 1 | 2 | - | ENE 301 ENE 401 |
| Electric Measurements and Sensors | ECA 414 | 5 | 3 | 1 | 2 | - | ECA 204 ECA 301 |
| Computer Architecture | ECA 415 | 5 | 3 | 2 | 2 | - | INF 301 ECA 302 |
| CMOS Analog Circuit Design | ECA 416 | 5 | 3 | 2 | 2 | - | ECA 204 ECA 301 |
| Architecture of Parallel and Distributed Computing | ECA 417 | 5 | 3 | 1 | 2 | - | ECA 302 INF 301 |
| Power Electronics | ECA 418 | 5 | 3 | 1 | 2 | - | ECA 301 |
| CAD Tool Development for Integrated Circuit Design | ECA 419 | 5 | 3 | 1 | 1 | - | ECA 202 MTH 103 INF 401 |
| Advanced Electrical Machines | ENE 414 | 5 | 2 | 2 | 1 | 1 | ENE 413 |
| Advanced Database Topics | INF 414 | 5 | 3 | 1 | 2 | ı | INF 303 |
| Computational Geometry | INF 415 | 5 | 3 | 1 | 2 | - | INF 303 INF 401 |
| Computer Graphics | INF 416 | 5 | 3 | 2 | 1 | 1 | INF 201 INF 302 |
| Machine Vision | INF 417 | 5 | 3 | 1 | 1 | - | TEL 411 |
| Principles of Distributed Software Systems | INF 419 | 5 | 3 | 1 | 2 | 1 | INF 301 |
| Randomized Algorithms | INF 420 | 5 | 3 | 1 | 2 | - | INF 401 |
| Teaching of Informatics | INF 421 | 5 | 3 | 1 | 2 | - | - |
| Compilers | INF 422 | 5 | 3 | 1 | 2 | - | INF 201 INF 411 |
| Reinforcement Learning and Dynamic Optimization | INF 423 | 5 | 3 | 1 | 1 | - | TEL 414 INF 201 INF 311 |
| Functional Programming: Analytics and Applications | INF 424 | 5 | 4 | 2 | - | - | INF 102 |
| Statistical Signal Processing for Telecommunications | TEL 416 | 5 | 3 | 1 | 2 | - | MTH 201 TEL 401 MTH 102 |
| Information Theory and Coding | TEL 417 | 5 | 3 | 2 | 1 | - | MTH 201 TEL 302 |
| Computer Networks II | TEL 418 | 5 | 3 | 1 | 2 | - | TEL 402 |

| Modeling and Performance Analysis of Communication Networks | TEL 420 | 5 | 3 | 1 | - | - | MTH 201 TEL 402 |
|--|---------|---|---|---|---|---|--------------------|
| Satellite Links | TEL 421 | 5 | 3 | 1 | 2 | - | - |
| Large and Social Networks: Modeling and Analysis | TEL 422 | 5 | 3 | 1 | 1 | - | - |
| Stochastic Processes and Time Series Analysis | MTH 412 | 5 | 3 | 1 | 1 | - | MTH 201 |
| Dynamic Programming | PEM 411 | 5 | 2 | 1 | 2 | - | - |
| Small and Medium Enterprises and Innovation | PEM 412 | 5 | 2 | - | 2 | - | - |
| Elements of Law and Technical Legislation | SOC 412 | 5 | 3 | 1 | - | - | - |
| Industrial Sociology | SOC 413 | 5 | 3 | - | - | - | - |
| Practical Training III | ECE 412 | 5 | - | - | - | - | - |
| Chinese IV | CHN 412 | 3 | 2 | 2 | - | - | - |

Elective

| Title | Code | ECTS | Lec | Rec | Lab | Necessary Prerequisite | Recommended Prerequisite |
|---|--------------------|------|-----|-----|-----|---------------------------|--|
| Renewable Energy Sources | ENE 511 | 5 | 2 | 2 | 2 | - | ENE 301 |
| Analysis of Electric Power Systems | ENE 512 | 5 | 3 | 1 | 2 | - | ENE 301 ENE 401 |
| Economic Operation of Electricity Systems | ENE 513 | 5 | 3 | 1 | 2 | 1 | ENE 301 ENE 401 |
| Design of VLSI and ASIC Systems | ECA 511 | 5 | 3 | 2 | 2 | - | ECA 301 ECA 302 |
| Biomedical Technology | ECA 512 | 5 | 3 | - | 3 | - | ECA 204 |
| Electronic Energy Management Systems | ECA 513 | 5 | 3 | 1 | 2 | - | ECA 301 ENE 401 |
| Reconfigurable Digital Systems | ECA 514 | 5 | 3 | 1 | 2 | - | - |
| Data Management and Processing in Sensor Networks | INF 511 | 5 | 3 | 1 | 2 | - | INF 303 |
| Multiagent Systems | INF 512 | 5 | 3 | 2 | 1 | - | MTH 111 INF 311 INF 412 INF 423 |
| Cloud Computing and Fog Services | INF 513 | 5 | 3 | 2 | 1 | - | - |
| Robotics | SYS 512 PEM 512 | 5 | 3 | - | 3 | - | SYS 201 SYS 411 |
| Number Theory and Cryptography | TEL 511 | 5 | 3 | 2 | 1 | - | - |
| Elements of Mathematical Analysis | MTH 511 | 5 | 3 | 1 | - | - | MTH 101 MTH 103 |

10th Semester

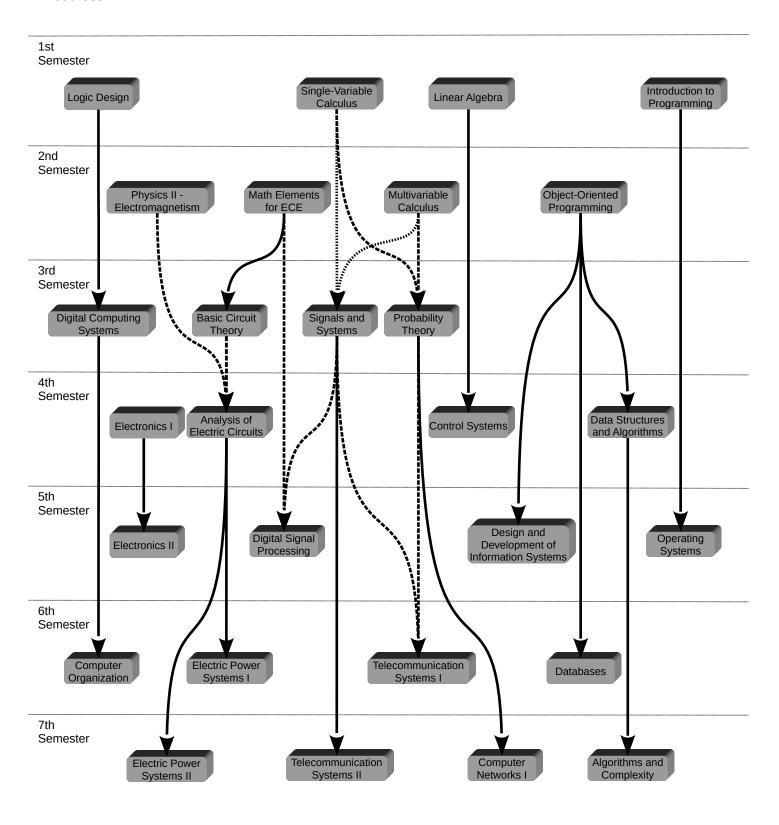
Compulsory

| Title | Code | ECTS | Lec | Rec | Lab | Necessary Prerequisite | Recommended Prerequisite |
|----------------|---------|------|-----|-----|-----|---------------------------|-----------------------------|
| Diploma Thesis | ECE 501 | 30 | - | - | - | - | - |

| Title | Code | ECTS | Lec | Rec | Lab | Necessary Prerequisite | Recommended Prerequisite |
|---------------------|---------|------|-----|-----|-----|---------------------------|-----------------------------|
| Erasmus+ Internship | ECE 511 | 30 | - | - | - | - | - |

Prerequisite Courses

Registration to certain compulsory courses of the curriculum of the School of ECE requires the successful completion of specific compulsory courses of lower semesters, as decided by the Assembly of the School. These courses, and their dependency on the corresponding prerequisite courses, are shown in detail in the dependency chart below. Note that there are only dependencies between years and not between semesters, so that students have multiple opportunities to successfully pass the prerequisite courses.



Choice of Courses

To complete the curriculum at the School of Electrical and Computer Engineering, students are required to select and successfully complete at least sixteen (16) elective required courses according to the following restrictions.

At least fourteen (14) courses within the School of ECE

The elective compulsory courses taught within the School of Electrical and Computer Engineering are listed by semester in the tables above and are coded ECA, INF, ECE, TEL, SYS, ENE, MTH, and PHY. This category also includes graduate courses of the School with the corresponding codes that the student may choose, if desired, with the permission of the instructor.

• At most one (1) course from the School of Production Engineering and Management:

| Title | Code | ECTS | Lec | Rec | Lab | Necessary Prerequisite | Recommended Prerequisite |
|---|--------------------|------|-----|-----|-----|---------------------------|-----------------------------|
| General Chemistry | CHE 111 | 5 | 3 | - | - | - | - |
| Dynamic Programming | PEM 411 | 5 | 2 | 1 | 2 | - | - |
| Small and Medium Enterprises and Innovation | PEM 412 | 5 | 2 | - | 2 | - | - |
| Simulation | PEM 311 | 5 | 4 | - | 2 | - | - |
| Robotics | SYS 512 PEM 512 | 5 | 3 | - | 3 | - | SYS 201 SYS 411 |

• At most one (1) course from the following humanities courses:

| Title | Code | ECTS | Lec | Rec | Lab | Necessary Prerequisite | Recommended Prerequisite |
|---|---------|------|-----|-----|-----|---------------------------|-----------------------------|
| Sociology | SOC 311 | 5 | 3 | - | - | - | - |
| Political Economy | SOC 314 | 5 | 3 | - | - | - | - |
| Introduction to Philosophy | SOC 315 | 5 | 3 | - | - | - | - |
| Micro- and Macro-Economic Analysis | SOC 411 | 5 | 3 | - | - | - | - |
| History of Civilization | SOC 316 | 5 | 3 | - | - | - | - |
| Philosophy and History of Science | SOC 312 | 5 | 3 | - | - | - | - |
| Elements of Law and Technical Legislation | SOC 412 | 5 | 3 | 1 | - | - | - |
| Art and Technology | SOC 313 | 5 | 3 | - | - | - | - |
| Industrial Sociology | SOC 413 | 5 | 3 | - | - | - | - |

Students are advised to pay attention to their choice of courses in order to complete the minimum number of credits required to obtain a diploma.

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