School of ECE at TUC: Short Overview of the Undergraduate Program

June 16, 2024

Overview

- Diploma in Electrical and Computer Engineering (integrated master)
- Degree requirements
  - Duration: 300 ECTS (30 ECTS per semester)
  - Recommended duration: 9 semesters of courses, 1 semester for thesis
  - A total of 49 courses (about 33% electives)
  - No minor requirements
- History:
  - Accepted 30 students in 1990
  - Today: 27 faculty members (70% have a PhD from abroad), 25 scientific staff members, 150-200 first-year students

Outcomes for graduates

- Very low unemployment
- A reasonable proportion goes on to PhD
- Highly sought as graduate students

Philosophy of the curriculum

- Unified program of study (no “areas,” “directions,” or “specialties”)
- Low number of courses (5 per semester)[1]
- Strong lab/hands-on focus in most of the courses
- Produce high-quality graduates
- Prerequisites

[1] compared to competing curricula in Greece

Degree requirements

- 29 core (compulsory) courses
- 16 elective courses (or more!)
- English (4 courses)
- Electives can be:
  - At least 14 offered by the School
  - up to (1) offered by other departments (5 listed)

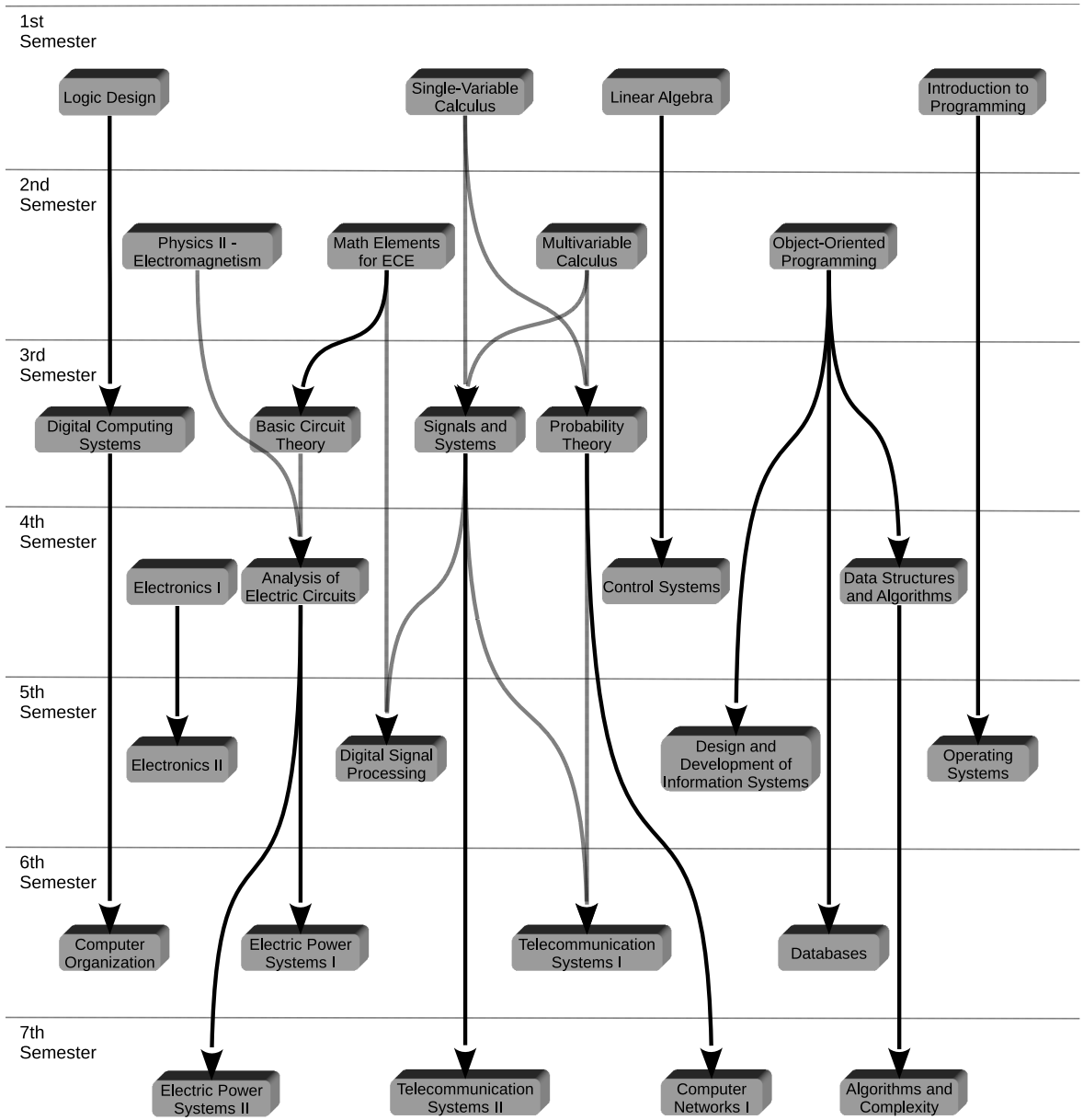
Chemistry	Dynamic programming	SMEs and innovation
Robotics	Simulation	

  - up to (2) graduates courses
  - up to (1) social science course (9 listed)
- Diploma thesis (nominally eq. to 30 ECTS/1 semester)

Core courses

Year	Math/science	EE	CE
1	Calculus I Calculus II Linear Algebra Math for ECE Physics		Logic Design Intro to Programming OO Programming
2	Probability	Circuits I Signals and Systems Cirquits II Electronics I Control Systems	Digital Computers Data Structures
3		Electronis II Digital Signals Energy Systems I Telecom Systems I	Information Systems Operating Systems Computer Organization Databases
4		Energy Systems II Telecom Systems II	Algorithms and Complexity Computer Networks Theory of Computation

Prerequisites



Elective courses

Math/science
Discrete math
Physics II
Numerical analysis
Differential equations
Mathematical biology
Intro to quantum computing
Quantum technology
Tensor calculus
Applied mathematics
Cryptography & number theory
Functional analysis
Spatial stochastic processes & apps
Parallel scientific computing

EE
Electric materials
EM propagation and antennas
Optoelectronics
Electric machines
Digital image processing
Pattern recognition
Telecom. system design
Optimization
Wireless comm.
Energy production and networks
Electrical installation design
Measurements and sensors
CMOS design
Power electronics
Topics in electric machines
Statistical signal processing
Information theory and coding
Time series analysis
Biomedical technology
Renewable energy sources
Electric system analysis
Electric energy economics
Energy management electronics
Emerging nano-electronic devices
High voltage engineering

CE
Systems programming
Artificial intelligence
Embedded systems
System Security
Autonomous agents
Human-computer Interaction
Computer architecture
Parallel and distr. computing
Advanced databases
Computational geometry
Graphics
Computer vision
Distributed systems
Randomized algorithms
Data analytics
Computer networks II
Queueing models for networks
Social network modeling
VLSI and ASIC design
Reconfigurable digital systems
Sensor networks
Multiagent systems
Services in cloud and fog
Robotic algorithms
Modern mobile syst, apps, services
Generative artificial intelligence

Lab work

Labs in core courses (bench)

- Circuits (2 semesters)
- Electronics (2 semesters)
- Energy systems (2 semesters)
- Hardware (3 semesters)
- Programming (4 semesters)
- Signals & Telecom. (3 semesters)
- Control (1 semester)
- Physics (1 semester)
- Math (1 semester)

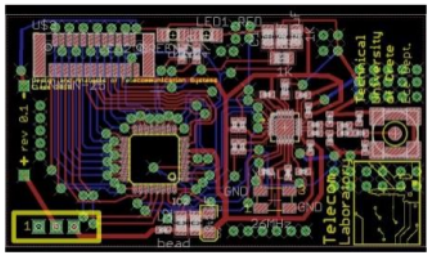
Remarks:

- Most courses have a term project

Lab in core courses (term project):

- Digital signal processing
- Telecom. systems
- Operating systems
- Databases

Undergraduate course projects

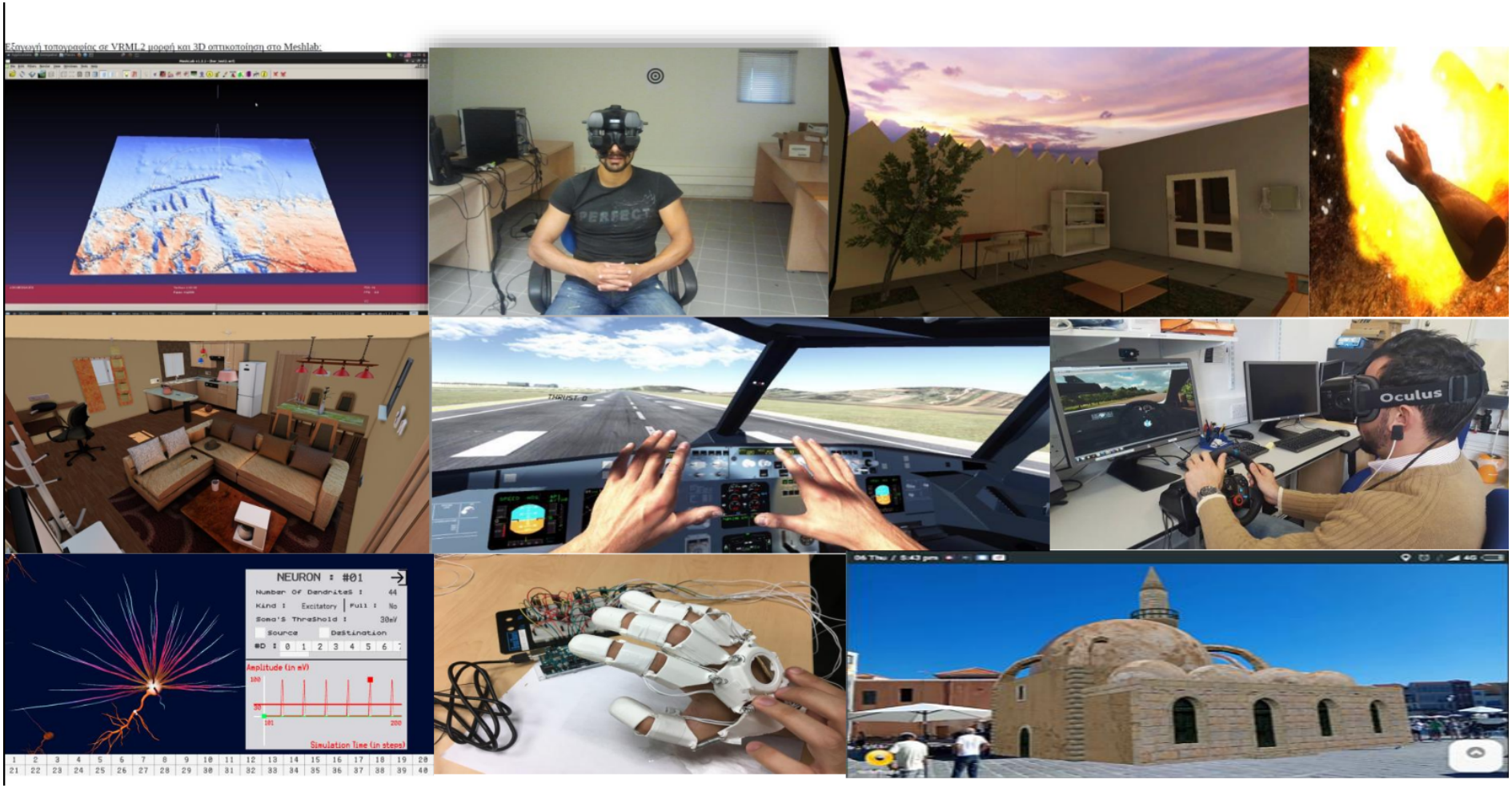


Digital Garden Group

Undergraduate course projects

RoboCup "Kouretes" Group

Undergraduate course projects



3D Computer Graphics & AR/VR Group

Diploma thesis

- Nominal duration is 1 semester, in practice students start early
- Major writing requirement (most theses are 50–100 pages long)
- Topics negotiated between student and supervisor, approved by school assembly
  - Students who want to continue to doctoral studies/abroad often undertake research topics
- One main supervisor, part of 3-seat committee (mostly for the defense talk)
- 1 hr defense talk
- Frequently, results are publishable

Internships & educational trips

- Practical Training
  - Optional, during the 3rd or 4th year
  - Students employed as interns in public/private institutions for practical training
  - Funding for internships in Greece (NSRF) or EU (Erasmus+).
  - Counts for one elective course, if it lasts for at least 3 months.
- Educational trips
  - Case 1: In the context of courses
  - Case 2: Weekly trips in the end of Spring Semester

Connection with industry

- Career Days
  - Visit by Deloitte (Nov. 25, 2022)

  - Visit by Renesas (Dec. 2, 2022)

  - Visit by Raycap (Mar. 31, 2023)
  - Visit by Netcompany-Intrasoft (June 2, 2023)

Curriculum evolution

- External Advisory Board

Anastasia Ailamaki
EPFL

Dionysios Aliprantis
Purdue Univ.

Nicholas Buris
Amazon

Christos Cassandras
Boston University

Georgios Dimou
Niobium Microsyst.

  - Tasks: Evaluation the progress of the staff of our School, recommendations on strategic directions and/or improvement measures.
- Student Exchange Agreements
  - Four (4) Erasmus+ Agreements: EURECOM, Cracow University of Technology, University Toulouse III, Universidad de Valladolid
  - One (1) Agreement with a US institution: University of Southern California
- Continuous evolution, slight changes every year with focus on lab-based teaching in conjunction with strong theoretic background

Strengths of the ECE undergraduate curriculum

- unified curriculum
- intense laboratory practice
- graduates find work, even during the recent financial crisis
- all Professors have experience abroad
- important international distinctions every year
- many graduates in top universities abroad (e.g., graduates in 2018, 2019, 2021 were offered full PhD studies fellowship from MIT)
- many graduates are today Professors in USA and Europe

Graduates of the School of ECE of the Technical University of Crete
that today are Professors in Europe and the US

Constantine Dovrolis
(graduated in 1995)
Georgia Institute of Technology, USA

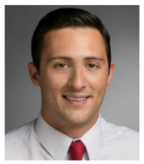
Georgios Smaragdakis
(graduated in 2002)
Delft University of Technology, The Netherlands

Evangelos Kalogerakis
(graduated in 2005)
University of Massachusetts Amherst, USA

Spyros Blanas
(graduated in 2006)
Ohio State University, USA

Dimitris Papailiopoulos
(graduated in 2007)
University of Wisconsin–Madison, USA

Anastasios Kyrillidis
(graduated in 2008)
Rice University, USA

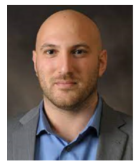


Panos Markopoulos
(graduated in 2010)
University of Texas at San Antonio, USA

Vagelis Papalexakis
(graduated in 2010)
University of California, Riverside, USA

Alexios Balatsoukas-Stimming
(graduated in 2010)
Eindhoven University of Technology, The Netherlands

Nikos Nikolaou
(graduated in 2011)
University College London, UK



Dimitrios Skarlatos
(graduated in 2014)
Carnegie Mellon University, USA

Vassilis Digalakis Jr
(graduated in 2018)
HEC Paris, France