School of Informatics AUTH Postgraduate Studies Program
Communication Networks and Systems Security

Expected learning outcomes of the program

The postgraduate program "Communication Networks and Systems Security" aims to promote knowledge, and train high-level scientists in the cutting edge of Communication Networks and Systems Security, as well as advance research in the above scientific areas producing graduates who will be able to successfully fill positions in the IT and Public Sector as well as positions in Research and Educational Institutions. The purpose of postgraduate program "Communication Networks and System Security" is fulfilled by attending organized postgraduate courses and preparing a Diploma Thesis in accordance with international academic standards that guarantee specialization and training in Communication Networks or in Systems Security.

In particular, upon successful completion of the program, the student in the direction of: A. “Communication Networks” investigates advanced technologies and new generation networks enabling the student to expand his/her knowledge on the dominant technologies used, analyze and examine future trends as well as cutting edge technologies. Specifically, the student will be able to:

- Describe the operation of a cellular mobile network, the fundamentals of operation of 2G, 3G, 4G cellular networks, and know the technologies used in 5G networks as well as in networking in data centers.
- Understand how affordable high-speed optical communications can be using standard semiconductor manufacturing technology with the goal of future replacement of copper wires with optical fibers or waveguides and electrons with photons.
- Become familiar with advanced distributed algorithms for new large-scale distributed computing environments such as cloud computing.
- Investigate issues related to the operation of modern networks, with an emphasis on the best practices followed at different network levels and the possibility of planning and implementing large corporate networks as well as solving their problems.
- Investigate the architecture of the Internet of Things systems by understanding the rapid technological developments with new applications in our daily life and the economy, understand the interactions between devices as well as between devices with the cloud computing environment , and become familiar with device

programming on sensor control and communication with the cloud computing environment.

- Gain a comprehensive view of the field of optical networks at an advanced level through the implementation of laboratory exercises and bibliographic studies including the security of optical networks.
- Investigate issues related to the physical layer in networks, multiple access issues, new generation wireless networks, wireless network security and related research trends.
- Become familiar with modern photonic systems for optical switching network architectures, introduction to photonic integration technologies, familiarization with integrated photonic amplification, switching and routing devices, and software for optical communication.
- Understand cryptography and cryptanalysis, network and internet security protocols, systems security, addressing threats to systems, identifying, and addressing security problems and vulnerabilities, security policies, introducing systems' litigation, economic, legal and ethical issues in security systems.
- Understand the concepts of modeling, simulating, and evaluating the performance of parallel and distributed computing systems and become familiar with advanced techniques for modeling, simulating and analyzing the performance of computing systems consisting of multiple processors.

B. "Systems Security" utilizes the background on communication networks and focuses on the reliability and security of the dominant systems and technologies by acquiring a cognitive background in an extremely important part of modern communication technology. Specifically, the student will be able to:

- Describe the operation of a cellular mobile network, the fundamentals of operation of 2G, 3G, 4G cellular networks, and know the technologies used in 5G networks as well as in networking in data centers.
- Become familiar with advanced distributed algorithms for new large-scale distributed computing environments such as cloud computing.
- Investigate issues related to the operation of modern networks, with an emphasis on the best practices followed at different network levels and the possibility of planning and implementing large corporate networks as well as solving their problems.
- Systematize elementary knowledge of basic cryptography and acquire new fundamental knowledge that is used in computer security.
- Understand the fundamental issues and technologies of computer security, be aware of security threats and vulnerabilities at the computer, infrastructure, application, and service level, understand the basic principles of access control mechanisms and become familiar with the design of appropriate protection for addressing security issues.

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Diploma Thesis are targeted at contemporary cutting-edge topics of the two specialization areas, simulations and/or experimental subjects, with modern software tools that are also used in companies, universities and large research centers while at the same time the students are given the opportunity to gain practical experience using the equipment and the infrastructure of the research laboratories belonging to the Department. Finally, in addition to specialized knowledge, the student will know how to search at the literature, to implement one or more established (state-of-the-art) techniques in terms of which he/she will compare the performance of the technique which suggests.

At the same time, the students in the various courses will make presentations of their work (communication skills, correct use of presentation techniques, familiarity with audience questions).

The goal of all the above, with the successful completion of the program, is

1. the generation of specialized scientific professionals that will be able to immediately join the labor market and meet the growing professional demand experienced internationally in the fields of communication networks and system security, both in the private and the wider public sector,

2. the connection of the educational process and the produced know-how with businesses in order to spread the new technologies connecting the Greek economy with the new dynamic branches of the international economic development while at the same time the elite of human resources (our graduates) will remain and work in Greece.