CS362 Software Engineering II

Type: Compulsory for SE

Level: Undergraduate
Semester: Spring
Credit: 7.5 ECTS units
Instructor: G. Papadopoulos

Objectives: Familiarization and understanding of advanced principles, concepts and practices of software engineering. A number of contemporary areas of software engineering will be covered. This course further serves as a “roadmap” for advanced electives and graduate courses in software engineering.


Prerequisites: CS241, CS361

Bibliography:


Teaching methods: Lectures (3 hours weekly) and Laboratory sessions (1.5 hours weekly).
Assessment: Final exam, midterm exam, homework (theoretical problems – study / analysis of a software system) and lab exercise.

CS363 Professional Practice in Software Engineering

Type: Compulsory for SE

Level: Undergraduate
Semester: Spring
Credit: 7.5 ECTS units
Instructor: G. Kapitsaki

Objectives: Embedding and practical application of the theoretical approaches and methodologies of Software Engineering for the development of a product-software system that serves the needs of an organization belonging to the local market. Practical use of processes and tools, such as central and distributed version control systems (SVN and GitHub), testing at different levels, group communication, professionalism, and ethical conduct.
**Content:** Undertake and carrying out to completion a significant software project by small student groups (of about 2-6 students each). All phases in the development of software. Some of the specific projects come from the industrial sector. Version control systems (SVN and GitHub). Testing. Software system analysis through software metrics. Specialized issues depending on the project nature (e.g., deployment on web servers, GUI tools and frameworks etc.).

**Prerequisites:** CS361

**Bibliography:**

1. Selected articles

**Teaching methods:** Students are grouped in teams of 2-6 persons. Meetings/ discussions are held regularly (weekly per team). Laboratory sessions (1.5 hours weekly).

**Assessment:** Assessment of the product-software system, assessment of the corresponding documentation, oral presentation and exam.

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**CS326: Systems Security**

**Type:** Compulsory

**Level:** Undergraduate

**Semester:** Spring

**Credit:** 7.5 ECTS units

**Instructor:** E. Athanasopoulos

**Objectives:** Introduction to systems security aiming for covering a wide range of security concepts. Primarily, the course helps students to become familiar with different fields and to render a global view of modern systems security. The course covers several topics, such as applied cryptography, software vulnerabilities and memory errors, attacks and defenses, mobile security, web security, network security, privacy, and anonymity.

**Content:** Introduction to applied cryptography (symmetric, asymmetric, and stream ciphers, cryptographic hash functions, cryptographic protocols) and security models (CIA). Software vulnerabilities and memory errors (buffer overflows, integer overflows, use-after-free, dangling pointers). Attacks (code injection, code reuse). Defenses (non-executable pages, stack canaries, code randomization, CFI, SFI, side channels). Mobile security (Android iOS). Web security (cross-site scripting, CSRF, clickjacking, phishing). Network security (botnets, DDoS, spam, security economics). Privacy and anonymity (TOR).

**Prerequisites:** CS232

**Bibliography:**

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3. Published papers.

**Teaching methods:** Lectures (3 hours weekly), Recitation (1 hour weekly) and Laboratory sessions (2 hours weekly).

**Assessment:** Final exam, midterm exam and homework (including laboratory assignments).

**CS425 Internet Technologies**
- **Type:** Restricted choice for all directions
- **Level:** Undergraduate
- **Semester:** Spring
- **Credit:** 7.5 ECTS units
- **Instructor:** M. Dikaiakos

**Objectives:** Introduction to Internet and the World-Wide Web Technologies. Emphasis given on programming of Internet Systems and Services.

**Content:** Topics of Internet and World-Wide Web technologies, with an emphasis on WWW applications and Internet programming. The foundations of WWW applications including hypertext, navigation in hyperspace, hypertext usability, information overload, markup languages and methodologies of WWW application design. System issues related to Internet programming and performance: protocols, servers, WWW interactivity, Internet-based distributed systems.

**Prerequisites:** CS233, CS324

**Bibliography:**


**Teaching methods:** Lectures (3 hours weekly) and Laboratory sessions (1.5 hours weekly).

**Assessment:** Final exam, homework (weekly assignments) and class participation.
CS434 Logic Programming and Artificial Intelligence

*Type:* Restricted choice for GD  
*Level:* Undergraduate  
*Semester:* ………………  
*Credit:* 7.5 ECTS units  
*Instructor:* A. Kakas  

*Objectives:* Familiarization with the basic concepts of Logic Programming and practical exercises in implementing them with the PROLOG language. Development of capabilities of applying Logic Programming to problems of Artificial Intelligence.  

*Content:* Basic principles of Logic Programming and implementation using the language Prolog. Relation of Logic Programming to modern considerations regarding Artificial Intelligence. Solving application problems drawn from the fields of Artificial Intelligence and the Semantic Web, making use of Logic Programming and Constraint Logic Programming.  

*Prerequisites:* CS111

*Bibliography:*  

*Teaching methods:* Lectures (3 hours weekly) and Laboratory sessions (1 hour weekly).  
*Assessment:* Final exam, midterm exam and homework.

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CS445 Digital Image Processing

*Type:* Restricted Choice for GD and CSN  
*Level:* Undergraduate  
*Semester:* Fall  
*Credit:* 7.5 ECTS units  
*Instructor:* M. Neophitou  

*Objectives:* Introduction to the basic principles of Digital Image Processing: Digital Image and Video. Analysis and implementation of image and video processing and analysis algorithms and their application in industrial and biomedical systems.  


*Prerequisites:* CS132, MAS016

*Bibliography:*  

*Teaching methods:* Lectures (3 hours weekly) and Laboratory sessions (1.5 hours weekly).  
*Assessment:* Final exam, midterm exam and homework (laboratory exercises, additional exercises, final project).
CS426 Computer Graphics
Type: Restricted choice for GD
Level: Undergraduate
Semester: Fall
Credit: 7.5 ECTS units
Instructor: Y. Chrysanthou / E. Stavrakis
Objectives: Introduction to the basic principles of digital image synthesis. Explain how a 3-dimensional virtual world is defined starting from the geometry, the materials, the lights and cameras and how the 2-dimensional resulting image is produced by going through the graphics pipeline. Provision of both the theoretical foundations as well as practical skills through the use of industry standards, such as OpenGL or DirectX.
Content: Scene construction, scene hierarchies, camera specification, projections of primitives, clipping, visible surface determination, polygon rasterisation (z-buffer), texture mapping, local and global illumination, shadows, ray tracing, radiosity, real-time acceleration techniques.
Prerequisites: CS132
Bibliography:


Teaching methods: Lectures (3 hours weekly) and Laboratory sessions (1.5 hours weekly).
Assessment: Final exam, midterm exam and homework.

CS428 Internet of Things: Programming and Applications
Type: Restricted Choice for CSN
Level: Undergraduate
Semester: Spring
Credit: 7.5 ECTS units
Instructor: P. Evripidou
Objectives: --------
Prerequisites: CS221
Bibliography:

Teaching methods: Lectures (3 hours weekly), Recitation (1 hour weekly) and Laboratory (2 hours weekly).

Assessment: Final exam, midterm exam and homework.

CS422 Advanced Networks

Type:

Restricted choice

Level: Undergraduate

Semester: Spring

Credit: 7,5 ECTS units

Instructor: V. Vassiliou

Objectives: Extension of the basic knowledge about Computer Networks regarding architectures, techniques and protocols for the Internet.

Content: Advanced topics in Computer Networks and the Internet, such as: IPv6, Multicast Routing, QoS Routing, TCP Congestion Control, Performance Analysis, Multimedia Networking Applications, Realtime services and protocols, Quality of Service, MPLS, Traffic Engineering, Mobile and Wireless Networks, Issues in Security for Computer Networks. Introduction to advanced research topics (e.g. Internet of Things, wireless sensor networks, VANETs, 5G, Nanonetworks). Introduction to Network Management, Software Defined Networks. Cloud and Fog Computing..

Prerequisites: CS324

Bibliography:


Teaching methods: Lectures (3 hours weekly), Recitation (1 hour weekly) and Laboratory sessions (2 hours weekly).

Assessment: Final exam, midterm exam and homework (including laboratory exercises).