Course guide
270503 - ACAP - High Performance Computer Architecture

Last modified: 25/07/2025

Unit in charge: Barcelona School of Informatics
Teaching unit: 701 - DAC - Department of Computer Architecture.

Degree: MASTER'S DEGREE IN INFORMATICS ENGINEERING (Syllabus 2012). (Compulsory subject).

Academic year: 2025 **ECTS Credits:** 6.0 **Languages:** Spanish

LECTURER

Coordinating lecturer: ANGEL TORIBIO GONZALEZ

Others: Primer quadrimestre:
ANGEL TORIBIO GONZALEZ - 11, 12

PRIOR SKILLS

General knowledge of:
- TCP/IP networking
- Operating Systems basic administration and use of the operating system from the programs
- Software development

Basic knowledge of:
- Unix command line.
- Python programming language.
- Git version control system.

Warning. Students are supposed to have the above background before starting the laboratory sessions. Complimentary fast-paced materials will be provided before class to help students meet the above requirements.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CTE1. Capability to model, design, define the architecture, implement, manage, operate, administrate and maintain applications, networks, systems, services and computer contents.
CTE2. Capability to understand and know how to apply the operation and organization of Internet, technologies and protocols for next generation networks, component models, middleware and services.
CTE3. Capability to secure, manage, audit and certify the quality of developments, processes, systems, services, applications and software products.

Generical:
CG4. Capacity for mathematical modeling, calculation and simulation in technology and engineering companies centers, particularly in research, development and innovation tasks in all areas related to Informatics Engineering.
CG5. Capacity for the development, strategic planning, leadership, coordination and technical and financial management of projects in all areas of Informatics Engineering, keeping up with quality and environmental criteria.

Transversal:
CTR1. ENTREPRENEURSHIP AND INNOVATION: Capacity for knowing and understanding a business organization and the science that rules its activity, capability to understand the labour rules and the relationships between planning, industrial and commercial strategies, quality and profit. Capacity for developping creativity, entrepreneurship and innovation trend.
CTR3. TEAMWORK: Capacity of being able to work as a team member, either as a regular member or performing directive activities, in order to help the development of projects in a pragmatic manner and with sense of responsibility; capability to take into account the available resources.
CTR5. APPROPIATE ATTITUDE TOWARDS WORK: Capability to be motivated by professional achievement and to face new challenges, to have a broad vision of the possibilities of a career in the field of informatics engineering. Capability to be motivated by quality and continuous improvement, and to act strictly on professional development. Capability to adapt to technological or organizational changes. Capacity for working in absence of information and/or with time and/or resources constraints.
CTR6. REASONING: Capacity for critical, logical and mathematical reasoning. Capability to solve problems in their area of study. Capacity for abstraction: the capability to create and use models that reflect real situations. Capability to design and implement simple experiments, and analyze and interpret their results. Capacity for analysis, synthesis and evaluation.

Basic:
CB7. Ability to integrate knowledges and handle the complexity of making judgments based on information which, being incomplete or limited, includes considerations on social and ethical responsibilities linked to the application of their knowledge and judgments.
CB8. Capability to communicate their conclusions, and the knowledge and rationale underpinning these, to both skilled and unskilled public in a clear and unambiguous way.

TEACHING METHODOLOGY

Lectures, reading, and discussion of technical and research papers, Presentation of topics (and papers) by students. Laboratory sessions and a practical class project.

Students are required to bring their laptops to carry out the laboratory sessions and the practical class project.

Students are responsible for their Amazon Web Services (AWS) account, which serves as their cloud computing service provider.

LEARNING OBJECTIVES OF THE SUBJECT

1.Present the student with new execution environments required to manage the computing resources and simplify the development and integration of the different types of applications and services at nowadays Internet-scale systems.
2.Collaborate in the design, implementation and presentation of a cloud computing environment that is required for a class project.
3.Find and understand useful information to create innovative solutions.

STUDY LOAD

Type	Hours	Percentage
Hours small group	27,0	18.00
Self study	96,0	64.00
Hours large group	27,0	18.00

Total learning time: 150 h

CONTENTS

Lectures: Cloud Computing fundamentals

Description:
Fundamental concepts: The effect of scale on system properties.
---- Issues in large-scale systems: virtualization, service orientation and composition, availability, locality, performance and adaptation.
---- Models for large-scale systems: system models for analysis, architectural models and service/deployment models.
---- Scaling techniques: basic techniques, scalable computing techniques for architectural models.
---- Middleware and Applications: computing, storage, web, content distribution, Internet-scale systems or services.
---- Environment and applications requirements.

Laboratory sessions: Practical view of Cloud Computing

Description:
Big Data Analytics in the Cloud
---- APIs: The Doors in the Cloud
---- Current required layers in Big Data Software Stack
---- New Software requirements for Advanced Analytics
---- New Hardware requirements for Advanced Analytics

Assigment: Experimental part

Description:
Development of a prototype application using Cloud service offerings (such as AWS, Google AppEngine, Open Stack, OpenNebula)
---- Development of a prototype application using advanced analytics services either provided regarding APIs or Software as a Service.

ACTIVITIES

Presentation of the subject and Introduction to Cloud Computing and Big Data Analytics

Specific objectives:
1

Related competencies :
CTE1. Capability to model, design, define the architecture, implement, manage, operate, administrate and maintain applications, networks, systems, services and computer contents.
CTE2. Capability to understand and know how to apply the operation and organization of Internet, technologies and protocols for next generation networks, component models, middleware and services.
CTR1. ENTREPRENEURSHIP AND INNOVATION: Capacity for knowing and understanding a business organization and the science that rules its activity, capability to understand the labour rules and the relationships between planning, industrial and commercial strategies, quality and profit. Capacity for developping creativity, entrepreneurship and innovation trend.
CTR6. REASONING: Capacity for critical, logical and mathematical reasoning. Capability to solve problems in their area of study. Capacity for abstraction: the capability to create and use models that reflect real situations. Capability to design and implement simple experiments, and analyze and interpret their results. Capacity for analysis, synthesis and evaluation.

Full-or-part-time: 8h
Self study: 4h
Theory classes: 4h

Virtualization

Specific objectives:
1

Related competencies :
CTE1. Capability to model, design, define the architecture, implement, manage, operate, administrate and maintain applications, networks, systems, services and computer contents.
CTE2. Capability to understand and know how to apply the operation and organization of Internet, technologies and protocols for next generation networks, component models, middleware and services.
CTR1. ENTREPRENEURSHIP AND INNOVATION: Capacity for knowing and understanding a business organization and the science that rules its activity, capability to understand the labour rules and the relationships between planning, industrial and commercial strategies, quality and profit. Capacity for developping creativity, entrepreneurship and innovation trend.
CTR6. REASONING: Capacity for critical, logical and mathematical reasoning. Capability to solve problems in their area of study. Capacity for abstraction: the capability to create and use models that reflect real situations. Capability to design and implement simple experiments, and analyze and interpret their results. Capacity for analysis, synthesis and evaluation.

Full-or-part-time: 6h
Self study: 4h
Theory classes: 2h

Cloud Computing Architecture

Specific objectives:
1, 3

Related competencies :
CB8. Capability to communicate their conclusions, and the knowledge and rationale underpinning these, to both skilled and unskilled public in a clear and unambiguous way.
CTE1. Capability to model, design, define the architecture, implement, manage, operate, administrate and maintain applications, networks, systems, services and computer contents.
CTE2. Capability to understand and know how to apply the operation and organization of Internet, technologies and protocols for next generation networks, component models, middleware and services.
CTE3. Capability to secure, manage, audit and certify the quality of developments, processes, systems, services, applications and software products.
CG5. Capacity for the development, strategic planning, leadership, coordination and technical and financial management of projects in all areas of Informatics Engineering, keeping up with quality and environmental criteria.
CTR1. ENTREPRENEURSHIP AND INNOVATION: Capacity for knowing and understanding a business organization and the science that rules its activity, capability to understand the labour rules and the relationships between planning, industrial and commercial strategies, quality and profit. Capacity for developping creativity, entrepreneurship and innovation trend.
CTR6. REASONING: Capacity for critical, logical and mathematical reasoning. Capability to solve problems in their area of study. Capacity for abstraction: the capability to create and use models that reflect real situations. Capability to design and implement simple experiments, and analyze and interpret their results. Capacity for analysis, synthesis and evaluation.

Full-or-part-time: 18h
Self study: 12h
Theory classes: 6h

Best Practices for creating SaaS

Specific objectives:
2, 3

Related competencies :
CB7. Ability to integrate knowledges and handle the complexity of making judgments based on information which, being incomplete or limited, includes considerations on social and ethical responsibilities linked to the application of their knowledge and judgments.
CB8. Capability to communicate their conclusions, and the knowledge and rationale underpinning these, to both skilled and unskilled public in a clear and unambiguous way.
CTE1. Capability to model, design, define the architecture, implement, manage, operate, administrate and maintain applications, networks, systems, services and computer contents.
CTE2. Capability to understand and know how to apply the operation and organization of Internet, technologies and protocols for next generation networks, component models, middleware and services.
CTE3. Capability to secure, manage, audit and certify the quality of developments, processes, systems, services, applications and software products.
CG5. Capacity for the development, strategic planning, leadership, coordination and technical and financial management of projects in all areas of Informatics Engineering, keeping up with quality and environmental criteria.
CG4. Capacity for mathematical modeling, calculation and simulation in technology and engineering companies centers, particularly in research, development and innovation tasks in all areas related to Informatics Engineering.
CTR3. TEAMWORK: Capacity of being able to work as a team member, either as a regular member or performing directive activities, in order to help the development of projects in a pragmatic manner and with sense of responsibility; capability to take into account the available resources.
CTR1. ENTREPRENEURSHIP AND INNOVATION: Capacity for knowing and understanding a business organization and the science that rules its activity, capability to understand the labour rules and the relationships between planning, industrial and commercial strategies, quality and profit. Capacity for developping creativity, entrepreneurship and innovation trend.
CTR6. REASONING: Capacity for critical, logical and mathematical reasoning. Capability to solve problems in their area of study. Capacity for abstraction: the capability to create and use models that reflect real situations. Capability to design and implement simple experiments, and analyze and interpret their results. Capacity for analysis, synthesis and evaluation.
CTR5. APPROPIATE ATTITUDE TOWARDS WORK: Capability to be motivated by professional achievement and to face new challenges, to have a broad vision of the possibilities of a career in the field of informatics engineering. Capability to be motivated by quality and continuous improvement, and to act strictly on professional development. Capability to adapt to technological or organizational changes. Capacity for working in absence of information and/or with time and/or resources constraints.

Full-or-part-time: 6h
Self study: 4h
Theory classes: 2h

Cloud Security

Specific objectives:
1, 3

Related competencies :
CB8. Capability to communicate their conclusions, and the knowledge and rationale underpinning these, to both skilled and unskilled public in a clear and unambiguous way.
CTE1. Capability to model, design, define the architecture, implement, manage, operate, administrate and maintain applications, networks, systems, services and computer contents.
CTE2. Capability to understand and know how to apply the operation and organization of Internet, technologies and protocols for next generation networks, component models, middleware and services.
CTE3. Capability to secure, manage, audit and certify the quality of developments, processes, systems, services, applications and software products.
CG5. Capacity for the development, strategic planning, leadership, coordination and technical and financial management of projects in all areas of Informatics Engineering, keeping up with quality and environmental criteria.
CTR1. ENTREPRENEURSHIP AND INNOVATION: Capacity for knowing and understanding a business organization and the science that rules its activity, capability to understand the labour rules and the relationships between planning, industrial and commercial strategies, quality and profit. Capacity for developping creativity, entrepreneurship and innovation trend.
CTR6. REASONING: Capacity for critical, logical and mathematical reasoning. Capability to solve problems in their area of study. Capacity for abstraction: the capability to create and use models that reflect real situations. Capability to design and implement simple experiments, and analyze and interpret their results. Capacity for analysis, synthesis and evaluation.

Full-or-part-time: 12h
Self study: 8h
Theory classes: 4h

Shared Knowledge on current trending topics

Specific objectives:
1, 3

Related competencies :
CB8. Capability to communicate their conclusions, and the knowledge and rationale underpinning these, to both skilled and unskilled public in a clear and unambiguous way.
CTE1. Capability to model, design, define the architecture, implement, manage, operate, administrate and maintain applications, networks, systems, services and computer contents.
CTE2. Capability to understand and know how to apply the operation and organization of Internet, technologies and protocols for next generation networks, component models, middleware and services.
CTE3. Capability to secure, manage, audit and certify the quality of developments, processes, systems, services, applications and software products.
CG5. Capacity for the development, strategic planning, leadership, coordination and technical and financial management of projects in all areas of Informatics Engineering, keeping up with quality and environmental criteria.
CTR1. ENTREPRENEURSHIP AND INNOVATION: Capacity for knowing and understanding a business organization and the science that rules its activity, capability to understand the labour rules and the relationships between planning, industrial and commercial strategies, quality and profit. Capacity for developping creativity, entrepreneurship and innovation trend.
CTR6. REASONING: Capacity for critical, logical and mathematical reasoning. Capability to solve problems in their area of study. Capacity for abstraction: the capability to create and use models that reflect real situations. Capability to design and implement simple experiments, and analyze and interpret their results. Capacity for analysis, synthesis and evaluation.

Full-or-part-time: 16h
Self study: 12h
Theory classes: 4h

Collaborative class project

Specific objectives:
2

Related competencies :
CB7. Ability to integrate knowledges and handle the complexity of making judgments based on information which, being incomplete or limited, includes considerations on social and ethical responsibilities linked to the application of their knowledge and judgments.
CTE1. Capability to model, design, define the architecture, implement, manage, operate, administrate and maintain applications, networks, systems, services and computer contents.
CG5. Capacity for the development, strategic planning, leadership, coordination and technical and financial management of projects in all areas of Informatics Engineering, keeping up with quality and environmental criteria.
CG4. Capacity for mathematical modeling, calculation and simulation in technology and engineering companies centers, particularly in research, development and innovation tasks in all areas related to Informatics Engineering.
CTR3. TEAMWORK: Capacity of being able to work as a team member, either as a regular member or performing directive activities, in order to help the development of projects in a pragmatic manner and with sense of responsibility; capability to take into account the available resources.
CTR1. ENTREPRENEURSHIP AND INNOVATION: Capacity for knowing and understanding a business organization and the science that rules its activity, capability to understand the labour rules and the relationships between planning, industrial and commercial strategies, quality and profit. Capacity for developping creativity, entrepreneurship and innovation trend.
CTR6. REASONING: Capacity for critical, logical and mathematical reasoning. Capability to solve problems in their area of study. Capacity for abstraction: the capability to create and use models that reflect real situations. Capability to design and implement simple experiments, and analyze and interpret their results. Capacity for analysis, synthesis and evaluation.
CTR5. APPROPIATE ATTITUDE TOWARDS WORK: Capability to be motivated by professional achievement and to face new challenges, to have a broad vision of the possibilities of a career in the field of informatics engineering. Capability to be motivated by quality and continuous improvement, and to act strictly on professional development. Capability to adapt to technological or organizational changes. Capacity for working in absence of information and/or with time and/or resources constraints.

Full-or-part-time: 52h
Self study: 36h
Theory classes: 5h
Laboratory classes: 11h

Lab 1: Basic knowledge toolbox

Specific objectives:
2, 3

Related competencies :
CB7. Ability to integrate knowledges and handle the complexity of making judgments based on information which, being incomplete or limited, includes considerations on social and ethical responsibilities linked to the application of their knowledge and judgments.
CB8. Capability to communicate their conclusions, and the knowledge and rationale underpinning these, to both skilled and unskilled public in a clear and unambiguous way.
CTE1. Capability to model, design, define the architecture, implement, manage, operate, administrate and maintain applications, networks, systems, services and computer contents.
CTE2. Capability to understand and know how to apply the operation and organization of Internet, technologies and protocols for next generation networks, component models, middleware and services.
CTE3. Capability to secure, manage, audit and certify the quality of developments, processes, systems, services, applications and software products.
CG5. Capacity for the development, strategic planning, leadership, coordination and technical and financial management of projects in all areas of Informatics Engineering, keeping up with quality and environmental criteria.
CG4. Capacity for mathematical modeling, calculation and simulation in technology and engineering companies centers, particularly in research, development and innovation tasks in all areas related to Informatics Engineering.
CTR3. TEAMWORK: Capacity of being able to work as a team member, either as a regular member or performing directive activities, in order to help the development of projects in a pragmatic manner and with sense of responsibility; capability to take into account the available resources.
CTR1. ENTREPRENEURSHIP AND INNOVATION: Capacity for knowing and understanding a business organization and the science that rules its activity, capability to understand the labour rules and the relationships between planning, industrial and commercial strategies, quality and profit. Capacity for developping creativity, entrepreneurship and innovation trend.
CTR6. REASONING: Capacity for critical, logical and mathematical reasoning. Capability to solve problems in their area of study. Capacity for abstraction: the capability to create and use models that reflect real situations. Capability to design and implement simple experiments, and analyze and interpret their results. Capacity for analysis, synthesis and evaluation.
CTR5. APPROPIATE ATTITUDE TOWARDS WORK: Capability to be motivated by professional achievement and to face new challenges, to have a broad vision of the possibilities of a career in the field of informatics engineering. Capability to be motivated by quality and continuous improvement, and to act strictly on professional development. Capability to adapt to technological or organizational changes. Capacity for working in absence of information and/or with time and/or resources constraints.

Full-or-part-time: 4h
Self study: 2h
Laboratory classes: 2h

Lab 2: Doors in the cloud

Specific objectives:
2, 3

Related competencies :
CB7. Ability to integrate knowledges and handle the complexity of making judgments based on information which, being incomplete or limited, includes considerations on social and ethical responsibilities linked to the application of their knowledge and judgments.
CB8. Capability to communicate their conclusions, and the knowledge and rationale underpinning these, to both skilled and unskilled public in a clear and unambiguous way.
CTE1. Capability to model, design, define the architecture, implement, manage, operate, administrate and maintain applications, networks, systems, services and computer contents.
CTE2. Capability to understand and know how to apply the operation and organization of Internet, technologies and protocols for next generation networks, component models, middleware and services.
CTE3. Capability to secure, manage, audit and certify the quality of developments, processes, systems, services, applications and software products.
CG5. Capacity for the development, strategic planning, leadership, coordination and technical and financial management of projects in all areas of Informatics Engineering, keeping up with quality and environmental criteria.
CG4. Capacity for mathematical modeling, calculation and simulation in technology and engineering companies centers, particularly in research, development and innovation tasks in all areas related to Informatics Engineering.
CTR3. TEAMWORK: Capacity of being able to work as a team member, either as a regular member or performing directive activities, in order to help the development of projects in a pragmatic manner and with sense of responsibility; capability to take into account the available resources.
CTR1. ENTREPRENEURSHIP AND INNOVATION: Capacity for knowing and understanding a business organization and the science that rules its activity, capability to understand the labour rules and the relationships between planning, industrial and commercial strategies, quality and profit. Capacity for developping creativity, entrepreneurship and innovation trend.
CTR6. REASONING: Capacity for critical, logical and mathematical reasoning. Capability to solve problems in their area of study. Capacity for abstraction: the capability to create and use models that reflect real situations. Capability to design and implement simple experiments, and analyze and interpret their results. Capacity for analysis, synthesis and evaluation.
CTR5. APPROPIATE ATTITUDE TOWARDS WORK: Capability to be motivated by professional achievement and to face new challenges, to have a broad vision of the possibilities of a career in the field of informatics engineering. Capability to be motivated by quality and continuous improvement, and to act strictly on professional development. Capability to adapt to technological or organizational changes. Capacity for working in absence of information and/or with time and/or resources constraints.

Full-or-part-time: 4h
Self study: 2h
Laboratory classes: 2h

Lab 3: Basic use of the cloud

Specific objectives:
2, 3

Related competencies :
CB7. Ability to integrate knowledges and handle the complexity of making judgments based on information which, being incomplete or limited, includes considerations on social and ethical responsibilities linked to the application of their knowledge and judgments.
CB8. Capability to communicate their conclusions, and the knowledge and rationale underpinning these, to both skilled and unskilled public in a clear and unambiguous way.
CTE1. Capability to model, design, define the architecture, implement, manage, operate, administrate and maintain applications, networks, systems, services and computer contents.
CTE2. Capability to understand and know how to apply the operation and organization of Internet, technologies and protocols for next generation networks, component models, middleware and services.
CTE3. Capability to secure, manage, audit and certify the quality of developments, processes, systems, services, applications and software products.
CG5. Capacity for the development, strategic planning, leadership, coordination and technical and financial management of projects in all areas of Informatics Engineering, keeping up with quality and environmental criteria.
CG4. Capacity for mathematical modeling, calculation and simulation in technology and engineering companies centers, particularly in research, development and innovation tasks in all areas related to Informatics Engineering.
CTR3. TEAMWORK: Capacity of being able to work as a team member, either as a regular member or performing directive activities, in order to help the development of projects in a pragmatic manner and with sense of responsibility; capability to take into account the available resources.
CTR1. ENTREPRENEURSHIP AND INNOVATION: Capacity for knowing and understanding a business organization and the science that rules its activity, capability to understand the labour rules and the relationships between planning, industrial and commercial strategies, quality and profit. Capacity for developping creativity, entrepreneurship and innovation trend.
CTR6. REASONING: Capacity for critical, logical and mathematical reasoning. Capability to solve problems in their area of study. Capacity for abstraction: the capability to create and use models that reflect real situations. Capability to design and implement simple experiments, and analyze and interpret their results. Capacity for analysis, synthesis and evaluation.
CTR5. APPROPIATE ATTITUDE TOWARDS WORK: Capability to be motivated by professional achievement and to face new challenges, to have a broad vision of the possibilities of a career in the field of informatics engineering. Capability to be motivated by quality and continuous improvement, and to act strictly on professional development. Capability to adapt to technological or organizational changes. Capacity for working in absence of information and/or with time and/or resources constraints.

Full-or-part-time: 4h
Self study: 2h
Laboratory classes: 2h

Lab 4: Use of services programmatically through their API

Specific objectives:
2, 3

Related competencies :
CB7. Ability to integrate knowledges and handle the complexity of making judgments based on information which, being incomplete or limited, includes considerations on social and ethical responsibilities linked to the application of their knowledge and judgments.
CB8. Capability to communicate their conclusions, and the knowledge and rationale underpinning these, to both skilled and unskilled public in a clear and unambiguous way.
CTE1. Capability to model, design, define the architecture, implement, manage, operate, administrate and maintain applications, networks, systems, services and computer contents.
CTE2. Capability to understand and know how to apply the operation and organization of Internet, technologies and protocols for next generation networks, component models, middleware and services.
CTE3. Capability to secure, manage, audit and certify the quality of developments, processes, systems, services, applications and software products.
CG5. Capacity for the development, strategic planning, leadership, coordination and technical and financial management of projects in all areas of Informatics Engineering, keeping up with quality and environmental criteria.
CG4. Capacity for mathematical modeling, calculation and simulation in technology and engineering companies centers, particularly in research, development and innovation tasks in all areas related to Informatics Engineering.
CTR3. TEAMWORK: Capacity of being able to work as a team member, either as a regular member or performing directive activities, in order to help the development of projects in a pragmatic manner and with sense of responsibility; capability to take into account the available resources.
CTR1. ENTREPRENEURSHIP AND INNOVATION: Capacity for knowing and understanding a business organization and the science that rules its activity, capability to understand the labour rules and the relationships between planning, industrial and commercial strategies, quality and profit. Capacity for developping creativity, entrepreneurship and innovation trend.
CTR6. REASONING: Capacity for critical, logical and mathematical reasoning. Capability to solve problems in their area of study. Capacity for abstraction: the capability to create and use models that reflect real situations. Capability to design and implement simple experiments, and analyze and interpret their results. Capacity for analysis, synthesis and evaluation.
CTR5. APPROPIATE ATTITUDE TOWARDS WORK: Capability to be motivated by professional achievement and to face new challenges, to have a broad vision of the possibilities of a career in the field of informatics engineering. Capability to be motivated by quality and continuous improvement, and to act strictly on professional development. Capability to adapt to technological or organizational changes. Capacity for working in absence of information and/or with time and/or resources constraints.

Full-or-part-time: 4h
Self study: 2h
Laboratory classes: 2h

Lab 5: Deploy a custom web app using additional cloud services

Specific objectives:
2, 3

Related competencies :
CB7. Ability to integrate knowledges and handle the complexity of making judgments based on information which, being incomplete or limited, includes considerations on social and ethical responsibilities linked to the application of their knowledge and judgments.
CB8. Capability to communicate their conclusions, and the knowledge and rationale underpinning these, to both skilled and unskilled public in a clear and unambiguous way.
CTE1. Capability to model, design, define the architecture, implement, manage, operate, administrate and maintain applications, networks, systems, services and computer contents.
CTE2. Capability to understand and know how to apply the operation and organization of Internet, technologies and protocols for next generation networks, component models, middleware and services.
CTE3. Capability to secure, manage, audit and certify the quality of developments, processes, systems, services, applications and software products.
CG5. Capacity for the development, strategic planning, leadership, coordination and technical and financial management of projects in all areas of Informatics Engineering, keeping up with quality and environmental criteria.
CG4. Capacity for mathematical modeling, calculation and simulation in technology and engineering companies centers, particularly in research, development and innovation tasks in all areas related to Informatics Engineering.
CTR3. TEAMWORK: Capacity of being able to work as a team member, either as a regular member or performing directive activities, in order to help the development of projects in a pragmatic manner and with sense of responsibility; capability to take into account the available resources.
CTR1. ENTREPRENEURSHIP AND INNOVATION: Capacity for knowing and understanding a business organization and the science that rules its activity, capability to understand the labour rules and the relationships between planning, industrial and commercial strategies, quality and profit. Capacity for developping creativity, entrepreneurship and innovation trend.
CTR6. REASONING: Capacity for critical, logical and mathematical reasoning. Capability to solve problems in their area of study. Capacity for abstraction: the capability to create and use models that reflect real situations. Capability to design and implement simple experiments, and analyze and interpret their results. Capacity for analysis, synthesis and evaluation.
CTR5. APPROPIATE ATTITUDE TOWARDS WORK: Capability to be motivated by professional achievement and to face new challenges, to have a broad vision of the possibilities of a career in the field of informatics engineering. Capability to be motivated by quality and continuous improvement, and to act strictly on professional development. Capability to adapt to technological or organizational changes. Capacity for working in absence of information and/or with time and/or resources constraints.

Full-or-part-time: 4h
Self study: 2h
Laboratory classes: 2h

Lab 6: Run a custom web app in the cloud

Specific objectives:
2, 3

Related competencies :
CB7. Ability to integrate knowledges and handle the complexity of making judgments based on information which, being incomplete or limited, includes considerations on social and ethical responsibilities linked to the application of their knowledge and judgments.
CB8. Capability to communicate their conclusions, and the knowledge and rationale underpinning these, to both skilled and unskilled public in a clear and unambiguous way.
CTE1. Capability to model, design, define the architecture, implement, manage, operate, administrate and maintain applications, networks, systems, services and computer contents.
CTE2. Capability to understand and know how to apply the operation and organization of Internet, technologies and protocols for next generation networks, component models, middleware and services.
CTE3. Capability to secure, manage, audit and certify the quality of developments, processes, systems, services, applications and software products.
CG5. Capacity for the development, strategic planning, leadership, coordination and technical and financial management of projects in all areas of Informatics Engineering, keeping up with quality and environmental criteria.
CG4. Capacity for mathematical modeling, calculation and simulation in technology and engineering companies centers, particularly in research, development and innovation tasks in all areas related to Informatics Engineering.
CTR3. TEAMWORK: Capacity of being able to work as a team member, either as a regular member or performing directive activities, in order to help the development of projects in a pragmatic manner and with sense of responsibility; capability to take into account the available resources.
CTR1. ENTREPRENEURSHIP AND INNOVATION: Capacity for knowing and understanding a business organization and the science that rules its activity, capability to understand the labour rules and the relationships between planning, industrial and commercial strategies, quality and profit. Capacity for developping creativity, entrepreneurship and innovation trend.
CTR6. REASONING: Capacity for critical, logical and mathematical reasoning. Capability to solve problems in their area of study. Capacity for abstraction: the capability to create and use models that reflect real situations. Capability to design and implement simple experiments, and analyze and interpret their results. Capacity for analysis, synthesis and evaluation.
CTR5. APPROPIATE ATTITUDE TOWARDS WORK: Capability to be motivated by professional achievement and to face new challenges, to have a broad vision of the possibilities of a career in the field of informatics engineering. Capability to be motivated by quality and continuous improvement, and to act strictly on professional development. Capability to adapt to technological or organizational changes. Capacity for working in absence of information and/or with time and/or resources constraints.

Full-or-part-time: 4h
Self study: 2h
Laboratory classes: 2h

Lab 7: Continuous Integration, Continuous Delivery, and Observability

Specific objectives:
2, 3

Related competencies :
CB7. Ability to integrate knowledges and handle the complexity of making judgments based on information which, being incomplete or limited, includes considerations on social and ethical responsibilities linked to the application of their knowledge and judgments.
CB8. Capability to communicate their conclusions, and the knowledge and rationale underpinning these, to both skilled and unskilled public in a clear and unambiguous way.
CTE1. Capability to model, design, define the architecture, implement, manage, operate, administrate and maintain applications, networks, systems, services and computer contents.
CTE2. Capability to understand and know how to apply the operation and organization of Internet, technologies and protocols for next generation networks, component models, middleware and services.
CTE3. Capability to secure, manage, audit and certify the quality of developments, processes, systems, services, applications and software products.
CG5. Capacity for the development, strategic planning, leadership, coordination and technical and financial management of projects in all areas of Informatics Engineering, keeping up with quality and environmental criteria.
CG4. Capacity for mathematical modeling, calculation and simulation in technology and engineering companies centers, particularly in research, development and innovation tasks in all areas related to Informatics Engineering.
CTR3. TEAMWORK: Capacity of being able to work as a team member, either as a regular member or performing directive activities, in order to help the development of projects in a pragmatic manner and with sense of responsibility; capability to take into account the available resources.
CTR1. ENTREPRENEURSHIP AND INNOVATION: Capacity for knowing and understanding a business organization and the science that rules its activity, capability to understand the labour rules and the relationships between planning, industrial and commercial strategies, quality and profit. Capacity for developping creativity, entrepreneurship and innovation trend.
CTR6. REASONING: Capacity for critical, logical and mathematical reasoning. Capability to solve problems in their area of study. Capacity for abstraction: the capability to create and use models that reflect real situations. Capability to design and implement simple experiments, and analyze and interpret their results. Capacity for analysis, synthesis and evaluation.
CTR5. APPROPIATE ATTITUDE TOWARDS WORK: Capability to be motivated by professional achievement and to face new challenges, to have a broad vision of the possibilities of a career in the field of informatics engineering. Capability to be motivated by quality and continuous improvement, and to act strictly on professional development. Capability to adapt to technological or organizational changes. Capacity for working in absence of information and/or with time and/or resources constraints.

Full-or-part-time: 4h
Self study: 2h
Laboratory classes: 2h

Lab 8: Serverless applications

Specific objectives:
2, 3

Related competencies :
CB7. Ability to integrate knowledges and handle the complexity of making judgments based on information which, being incomplete or limited, includes considerations on social and ethical responsibilities linked to the application of their knowledge and judgments.
CB8. Capability to communicate their conclusions, and the knowledge and rationale underpinning these, to both skilled and unskilled public in a clear and unambiguous way.
CTE1. Capability to model, design, define the architecture, implement, manage, operate, administrate and maintain applications, networks, systems, services and computer contents.
CTE2. Capability to understand and know how to apply the operation and organization of Internet, technologies and protocols for next generation networks, component models, middleware and services.
CTE3. Capability to secure, manage, audit and certify the quality of developments, processes, systems, services, applications and software products.
CG5. Capacity for the development, strategic planning, leadership, coordination and technical and financial management of projects in all areas of Informatics Engineering, keeping up with quality and environmental criteria.
CG4. Capacity for mathematical modeling, calculation and simulation in technology and engineering companies centers, particularly in research, development and innovation tasks in all areas related to Informatics Engineering.
CTR3. TEAMWORK: Capacity of being able to work as a team member, either as a regular member or performing directive activities, in order to help the development of projects in a pragmatic manner and with sense of responsibility; capability to take into account the available resources.
CTR1. ENTREPRENEURSHIP AND INNOVATION: Capacity for knowing and understanding a business organization and the science that rules its activity, capability to understand the labour rules and the relationships between planning, industrial and commercial strategies, quality and profit. Capacity for developping creativity, entrepreneurship and innovation trend.
CTR6. REASONING: Capacity for critical, logical and mathematical reasoning. Capability to solve problems in their area of study. Capacity for abstraction: the capability to create and use models that reflect real situations. Capability to design and implement simple experiments, and analyze and interpret their results. Capacity for analysis, synthesis and evaluation.
CTR5. APPROPIATE ATTITUDE TOWARDS WORK: Capability to be motivated by professional achievement and to face new challenges, to have a broad vision of the possibilities of a career in the field of informatics engineering. Capability to be motivated by quality and continuous improvement, and to act strictly on professional development. Capability to adapt to technological or organizational changes. Capacity for working in absence of information and/or with time and/or resources constraints.

Full-or-part-time: 4h
Self study: 2h
Laboratory classes: 2h

GRADING SYSTEM

Students will be evaluated on their participation in class, laboratory sessions, class attendance, reading and presenting reports and papers and assignments on specific topics.

The final grade for the course is the weighted average of the grades for the following components obtained in each part of the course:
· Lab sessions: 40%
· Papers Reading/Presentation and homework: 10%
· Course Projects: 30%
· Final exam: 20%

In order to be able to publicly defend the course project, students must have attended at least 70% of the classes and teams must have delivered on time the activities that have been planned during the course. The course project is the result of teamwork, which will be reflected in the grade given to the group as a whole. Each member of the group will be responsible for part of the project and might be graded individually on his or her contribution.

BIBLIOGRAPHY

Basic:
- Srinivasan, A.; Suresh, J. Cloud computing: a practical approach for learning and implementation. Uttar Pradesh: Pearson India Education Services Pvt. Ltd, 2014. ISBN 9788131776513.
- Murugesan, S.; Bojanova, I. Encyclopedia of cloud computing [on line]. Chichester, UK: Wiley-IEEE Press, 2016 [Consultation: 25/08/2025]. Available on: https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=4526670. ISBN 9781118821954.