



## Internationalization Programs Study Abroad 2020

**Course title:** CLOUD COMPUTING FOUNDATIONS WITH GOOGLE CLOUD PLATFORM

**Teaching period:** July 6 to July 24, 2020

**Teaching hours:** 60

**Academic coordinator:** José Joaquín Cañadas Martínez

**Knowledge area:** Computer Languages and Information Systems

**Prerequisite:** Some familiarity with computer programming and operating systems is mandatory

### 1. INTRODUCTION

The cloud is on everybody's lips nowadays. Cloud Computing is a way of using Information Technology that has five equally important features. First, you get computing resources on-demand and self-service. Second, you access these resources over the net from anywhere you want. Third, the provider of those resources has a big pool of them and allocates them to customers, who don't have to care about the exact physical location of those resources. Fourth, the resources are elastic. If you need more resources, you can get more, rapidly. And last, the customers pay only for what they use. Currently, the three most important global Cloud Computing providers are: Amazon Web Services, Microsoft Azure and Google Cloud Platform. In this course, we will focus on Google Cloud Platform, introducing its four main kind of services: compute, storage, big data and machine learning.

The Computer Languages and Information Systems knowledge area at the University of Almería has 16 full time professors, teaching courses in both bachelor's and master's degrees, mainly in Informatics Engineering bachelor's degree (also called Bachelor's Degree in Information Technology), and in Computer Science: Technology and Applications Master program, but also in others degrees such as Agricultural Engineering, Industrial Engineering, Tourism, and more.

The professor proposing this course has a wide experience teaching several courses related to cloud computing:

- In current Informatics Engineering bachelor's Degree, the optional course Software Engineering Methods and Tools (6 ECTS), which runs every year on the 6th semester of the degree. This course has been thought partially in English for the last 6 years.
- In the Informatics Engineering Master's degree, from 2014-15 to 2016-17, the mandatory course Cloud Computing Services and Applications (4,5 ECTS), that run every year on the 2nd semester of that extinguished master program.
- In current Informatics Engineering Technologies and Applications Master program, from 2017-2018 until now, two courses related to the topic: Cloud Computing (4 ECTS), a mandatory course that runs every year on the 1st semester of the program; and Cloud Computing Services and Applications (4 ECTS), an optional course that runs every year on the 2nd semester of the program.

In addition, he is member of the Google Cloud Platform international teaching community.



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### 2. OBJECTIVES

1. Provide students with little to no background or experience in cloud computing:
  - A detailed overview of concepts covering cloud basics, big data, machine learning, DevOps and Kubernetes.
  - An understanding of where and how the Google Cloud Platform fits in.
  - At the end of the course, provide the ability to articulate concepts and demonstrate hands-on skills.
2. Set students up to prepare for further specialization in specific areas like computing infrastructure, software application development, DevOps, big data and machine learning.
3. Introduce them to further learning and certification opportunities in the field

### 3. CONTENT

Modules	Description
<b>MODULE 1</b> So, What's the Cloud Anyway?	<ul style="list-style-type: none"> <li>• Discuss what the cloud is and why it's a technological and business game changer.</li> </ul> 45 mins (T) <span style="float: right;"><i>T = Theory, L = Labs</i></span>
<b>MODULE 2</b> Start with a Solid Platform	<ul style="list-style-type: none"> <li>• Describe the different ways a user can interact with GCP.</li> </ul> 50 mins (T) 1 hr 15 mins (L)
<b>MODULE 3</b> Use GCP to Build Your Apps	<ul style="list-style-type: none"> <li>• Discover the different compute options in GCP</li> </ul> 1 hr 30 mins (T) 1 hr 30 mins (L)
<b>MODULE 4</b> Where Do I Store This Stuff?	<ul style="list-style-type: none"> <li>• Implement a variety of structured and unstructured storage models</li> </ul> 1 hr 10 mins (T) 2 hrs 30 mins (L)
<b>MODULE 5</b> There's an API for That!	<ul style="list-style-type: none"> <li>• Discuss the different application managed service options in the cloud</li> </ul> 45 mins (T) 1 hr 30 mins (L)
<b>MODULE 6</b> You Can't Secure the Cloud, Right?	<ul style="list-style-type: none"> <li>• Outline how security in the cloud is administered in GCP.</li> </ul> 1 hr 10 mins (T) 1 hr 5 mins (L)
<b>MODULE 7</b> It Helps to Network	<ul style="list-style-type: none"> <li>• Demonstrate how to build secure networks in the cloud.</li> </ul> 1 hr 15 mins (T) 5 hrs 25 mins (L)
<b>MODULE 8</b> Let Google Keep an Eye on Things	<ul style="list-style-type: none"> <li>• Identify cloud automation and management tools.</li> </ul> 35 mins (T) 1 hr 5 mins (L)
<b>MODULE 9</b> You Have the Data, but What Are You Doing with It?	<ul style="list-style-type: none"> <li>• Discover a variety of managed big data services in the cloud.</li> </ul> 1 hr 5 mins (T) 2 hrs 30 mins (L)



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<p><b>MODULE 10</b> Let Machines Do the Work</p>	<ul style="list-style-type: none"> <li>• Explain what machine learning is, the terminology used, and its value proposition.</li> <li>• 1 hr 35 mins (T) 4 hrs 20 mins (L)</li> </ul>
<p><b>MODULE 11</b> Capstone Project</p>	<ul style="list-style-type: none"> <li>• Develop and implement a multi-faceted project that serves as a culminating academic experience for students</li> <li>• 30 mins (T) 12 hrs 40 mins (L)</li> </ul>
<p><b>MODULE 12</b> Docker containers and Kubernetes</p>	<ul style="list-style-type: none"> <li>• Introduce Docker containers and Kubernetes as a container orchestration tool</li> <li>• 2 hrs 30 min (T) 7 hrs 30 mins (L)</li> </ul>
<p><b>MODULE 13</b> DevOps</p>	<ul style="list-style-type: none"> <li>• Understand DevOps methodologies for developing and deploying applications</li> <li>• 30 min (T) 4 hrs 30 min (L)</li> </ul>
<p><b>MODULE 14</b> Google Assistant apps</p>	<ul style="list-style-type: none"> <li>• Develop interactive applications for digital assistants with cloud services for application deployment and code-free machine learning models</li> <li>• 1 hr (T) 4 hrs (L)</li> </ul>

### 4. METHODOLOGY

The course will run in a computer lab, where each student will use a computer. The methodology includes:

- Concepts and instructor led content.
- Experiential learning across many labs
- Capstone project to apply learning
- Assessment with multiple choice questions.

Experiential labs and capstone project are performed on the computer, using the cloud platform provided by Google. Slides, labs assignments and more material will be provided through the e-learning system.

The main language will be English.



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### 5. PROFESSIONAL VISITS AND COMPLEMENTARY ACADEMIC ACTIVITIES

- Second Friday: visit to local companies and startups using cloud platforms for their infrastructure. 1-3 companies, depending availability.
- Last Friday: Expert talks with experienced professionals regarding the current state and future of cloud technologies and their day-to-day work:
  - Video-conferences, as this way we will be able to access key profiles, combine several talks on the same day and keep costs to a minimum.
  - Companies to be announced. Will include engineers from Google Cloud Iberia, Google Cloud official partners, Google Developer Experts, authorized trainers and Google Cloud certified engineers
  - Profiles: Cloud architects, developers, devOps and trainers
  - Topics: cloud computing, devOps, Kubernetes and big data on the cloud
  - 3-4 experts/talks, depending availability and talk duration

### 6. ASSESSMENT

Continuous assessment:

- Experiential labs (60%)
- Attendance and active work in class (10%)

Final assessment:

- Capstone project (15%)
- Multiple choice questions (15%)

### 7. LECTURERS

#### Joaquín Cañadas

Joaquín Cañadas, PhD. is assistant professor in the Informatics Department at the University of Almeria, and a member of the Data, Knowledge and Software Engineering (DKSE) research group. His research interests are knowledge engineering, model-driven development, web-based decision support systems, and cloud computing services.

#### Marcos Manuel Ortega

Consultant, architect and trainer on cloud computing, big data and IoT. Over 7 years of experience, specialized on Google Cloud Platform. Google Cloud authorized trainer and 5x Google Cloud certified: Prof. Cloud Architect, Data Engineer, Cloud Developer, Cloud Network Engineer and Associate Cloud Engineer. His job is to travel all around Europe providing training for big enterprises and key Google customers and helping them moving their applications to the cloud, working with the main Google Cloud Authorized Training Partners. 3 years of experience as a trainer in cloud computing, web



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development and big data. Has provided training for e. g. the NHS Business Authority, the Department for Transport of the Government of the U. K., National Reference Centre for Training in New Technologies - ThinkTIC (Minister of Education - Government of La Rioja) and Advanced Technologies Center (Government of Aragón), among others. Very high proficiency in English and ample experience providing training in English.

### Manuel Torres

Manuel Torres, PhD. is associate professor in the Informatics Department at the University of Almería. He is member of the Information Systems research group. His research interests are related to databases and cloud computing in education. He has been the head of the Informatics Department for 4 years, and he is co-leader of the OpenStack private cloud project of the Informatics Department since 2014. Currently, he is the Chief Technology Innovation Officer at the University of Almería.

### Manel Mena

Manel Mena is a PhD candidate at the University of Almería and holds a Master's Degree in computer engineering by said university. Member of the Applied Computing Group (TIC-211) since 2016. Works alongside his peers in the national research project CoSmart (ref. TIN2017-83964-R). His interests include Data Engineering, Software Engineering, Big Data, Cloud Computing, Machine Learning and the Web of Things.

## 8. LITERATURE LIST

- 1) Dan C. Marinescu. Cloud Computing. Morgan Kaufmann. 2013.
- 2) S .P. T. Krishnan; Jose L. Ugia Gonzalez. Building Your Next Big Thing with Google Cloud Platform: A Guide for Developers and EnterpriseArchitects. Apress. 2015.
- 3) Dan Sullivan. Official Google Cloud Certified Associate Cloud Engineer Study Guide. Wiley. 2019
- 4) Ernesto Garbarino. Beginning Kubernetes on the Google Cloud Platform. Apress. 2019
- 5) Pierluigi Riti. Pro DevOps with Google Cloud Platform: With Docker, Jenkins, and Kubernetes. Apress. 2018

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Internationalization Vicerectorate  
UNIVERSIDAD DE ALMERÍA  
Tel. +34 950 01 5816  
E-mail: [sabroad@ual.es](mailto:sabroad@ual.es)