

**Jerash University**

**Faculty of Computer Science and Information Technology**

**Computer Sciences Department**

**Semester**: Fall Semester 2018/2019

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| **Course symbol and number:** 1001461 | **Course Name:** النظم الموزعة والسحابية |
| **Teaching Language:** English | **Prerequisites:** . **1001131** |
| **Credits:** 3 hours**.** | **Course Level:** 3 |

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| **Course Description** |
| Cloud Computing has transformed the IT industry by opening the possibility for infinite or at least highly elastic scalability in the delivery of enterprise applications and software as a service (SaaS). Amazon Elastic Cloud, Microsoft’s Azure, Google App Engine, and many other Cloud offerings give mature software vendors and new start-ups the option to deploy their applications to systems of infinite computational power with practically no initial capital investment and with modest operating costs proportional to the actual use. The course examines the most important APIs used in the Amazon and Microsoft Cloud, including the techniques for building, deploying, and maintaining machine images and applications. We will learn how to use Cloud as the infrastructure for existing and new services. We will use open source implementations of highly available clustering computational environments, as well as RESTFul Web services, to build very powerful and efficient applications. We also learn how to deal with not trivial issues in the Cloud, such as load balancing, caching, distributed transactions, and identity and authorization management. In the process we will also become very familiar with Linux operating system. |

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| **Course Objectives** |
| • Cloud computing has entered the mainstream of information technology, providing infinite or at least highly elastic scalability in delivery of enterprise applications and software as a service (SaaS). Amazon Elastic Cloud, Microsoft Azure, Google App Engine, and a few other offerings give both mature software vendors and start-ups the option to deploy their applications to a system of infinite computational power with practically no capital investment and with modest operating costs proportional to the actual use. The course examines the most important APIs used in the Amazon and Microsoft clouds. We learn how to use RESTful Web services, and cloud-based messaging and workflow services to construct new applications. We learn to migrate existing applications into the cloud, by navigating through phases such as creation of a private cloud; attaching, in a secure fashion, the private cloud to the public cloud; and provisioning and maintaining resources in the public cloud. We deal with non-trivial issues like load balancing, caching, distributed transactions, identity and authorization management, and data encryption. We introduce Hadoop and BigData services in the cloud. Prerequisites: Basic Java programming skills. |

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| **Learning Outcomes** |
| a. Analyze the trade-offs between deploying applications in the cloud and over the local infrastructure. b. Compare the advantages and disadvantages of various cloud computing platforms. c. Deploy applications over commercial cloud computing infrastructures such as Amazon Web Services, Windows Azure, and Google AppEngine. d. Program data intensive parallel applications in the cloud. e. Analyze the performance, scalability, and availability of the underlying cloud technologies and software. f. Identify security and privacy issues in cloud computing. g. Explain recent research results in cloud computing and identify their pros and cons. h. Solve a real-world . |

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|  | **Text Book(s)** |
| **Title** |  |
| **Author(s)** |  |
| **Publisher** |  |
| **Year** |  |
| **Edition** |  |

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|  | **References** |
| **Books** | There is no textbook required for this class. Each module is based on recent  conference/journal papers as well as documentation from cloud providers. These  papers and documentation are posted on the Schedule and Deadlines page. |
| **Internet links** | http://www.jpu.edu.jo/lms |
| **Course link** | [Click here](http://www.jpu.edu.jo/lms) |

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|  | **Instructors** |
| **Instructor** |  |
| **Office Location** | الطابق السادس - 611 |
| **Office Phone** | 666 |
| **E-mail** |  |

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| **Topics Covered** | | | |
| **Topics** | **Chapters in Text** | **Week number** | **Teaching hours** |
| **Cloud computing**: General Benefits and Architecture, Business Drivers, Main players in the Field, Overview of Security Issues, XaaS Cloud Based Service Offerings |  | 1-3 | 2 |
| **Key Amazon offerings**: EC2, SimpleDB, S3, Simple Queue, Simple Relational Database, Elastic MapReduce, Virtual Amazon Cloud. S3 Command Line tool |  | 4, 5, 6 | 2 |
| **Bundling Amazon instances**: We will learn how to create and manipulate Amazon instances with command line tools, transfer application software to instances and bundle them into new AMI-s that could be offered to the public. |  | 7 | 2 |
| **Amazon's Elastic Block Storage (EBS)** provides persistence storage in the cloud. We will learn how to move application code and data from non-EBS instance into EBS volumes, and create our own EBS based AMI-s |  | 8 | 3 |
| **Amazon's AWS Identity Management** and **Security in the Cloud** |  | 9 | 3 |
| **Amazon's Virtual Private Cloud(VPC) and Directory Service** |  | 10 | 4 |
| **Java AWS SDK, S3 API, Relational Database Service, SimlpeDB Service , NoSQL Databases** |  | 11 | 3 |
| A**mazon's Messaging in the Cloud** We will review details of AWS Simple Notification and Simple Queuing Service |  | 12 | 3 |
| **Amazon's RESTFul WebServices** AWS APIs are sufficiently rich to allow you easy interaction with AWS service. However, in order to establish connectivity between your own modules in the Cloud you should use RESTFul Web Services |  | 13 | 3 |
| **Elastic Load Balancing and Auto Scaling** allow automation of  resource manipulation |  | 14 | 2 |
| **Introduction to** **Microsoft Cloud** Microsoft offers a set of resources and features that are of great utility to those who are restricted to programming in .Net Environment |  | 15 | 2 |
|  | Handout |  |  |

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|  | **Evaluation** |  |
| **Assessment Tool** | **Expected Due Date** | **Weight** |
| Programming assignments and LMS |  | 20 % |
| First Exam |  | 20 % |
| Second Exam |  | 20 % |
| Final Exam | According to the University final examination schedule | 40 % |

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|  | **Policy** |
| **Attendance** | Attendance is very important for the course. In accordance with university policy, students missing more than the allowed absence rate of total classes are subject to failure. Penalties may be assessed without regard to the student's performance. Attendance will be recorded at the beginning or end of each class. |
| **Exams** | All exams will be CLOSE-BOOK; necessary algorithms/equations/relations will be supplied as convenient. |

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| **Class Schedule & Room** |

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| **Office Hours** | | |
| Sun: 11 – 12.30  Mon: 11 - 12:30  Tues: 11- 12.30  Wed: 11 – 12:30 | | |
|  | \* Or by an appointment through email |  |

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|  | **Teaching Assistant** |
| To announced later on. |  |

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|  | **Prerequisites** |
| **Prerequisites by course** |  |