Syllabus

Section DL1: Asynchronous Distance Learning Section *
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Office Hours: Wednesday (8:30 AM – 10:30 AM EST)
Email: vmarthal@gmu.edu (Email response time: 12-24 hours)

Course Description

IT 442 Cloud Infrastructure (3:3:0) this course is intended for students who seek an overall understanding of cloud computing, independent of specific technical roles. It provides a detailed overview of cloud concepts, core services, security, architecture, pricing, and support. In addition, students explore best practices and design patterns for architecting optimal IT solutions on cloud. A combination of lectures and hands-on lab assignments expose students to the leading cloud computing paradigms and services.

Prerequisites

The pre/co-requisites for this course are IT 341 (or permission of instructor). A grade of "C" or better must be achieved in the prerequisite course before a student is qualified to take this course. The prerequisite course must be completed prior to, not concurrently with, this course.

Course Delivery Method

This course will be delivered online using an asynchronous format via the Blackboard Learning Management system (Bb LMS) housed in the MyMason portal.

Learning Outcomes

On successful completion of this course, students will be able to:

- Describe the six advantages of cloud computing.
- Describe three cloud deployment models.
- Apply the AWS Cloud Adoption Framework to help organizations transform the way they work.
- Demonstrate the AWS pricing philosophy.
- Interpret fundamental pricing characteristics.
- Demonstrate the elements of Total Cost of Ownership.
- Explain the difference between AWS Regions, Availability Zones, and Edge Locations.
- Recognize the different AWS compute services.
- Describe Amazon Elastic Compute Cloud.
- Explain AWS Lambda, which is serverless computing.
- Describe AWS Elastic Beanstalk.
- Discuss storage services including Amazon EBS, Amazon S3, Amazon EFS, and Amazon Glacier.
- Describe use cases for storage options, along with a demonstration of Amazon Glacier.
- Understand storage pricing.
- Create virtual firewalls with security groups.
- Secure delivery of data, videos, applications, and APIs with Amazon CloudFront.
- Provide an overview of different database services in the cloud.
- Highlight the differences between unmanaged and managed database solutions.
- Differentiate between Structured Query Language and NoSQL databases.
- Review the availability differences of alternative database solutions.
- Distribute traffic across Amazon EC2 instances using Elastic Load Balancing.
- Discover the ability of Auto Scaling to launch servers in response to workload changes.
- Employ CloudWatch to monitor AWS resources and applications in real time.
- Describe different types of security credentials.
- Examine IAM users, groups, and roles.
- Describe the AWS Shared Responsibility Model.
- Examine IAM users, groups, and roles.
- Describe different types of security credentials.
- Review the AWS Trusted Advisor checks.
- Discuss security compliance.
- Understand best practices on day 1 with a new AWS account.
- Explore the well-architected pillars and design principles.
- Distinguish high availability and reliability.
- Describe the business impact of design decisions.
- Describe how to set up an organizational structure to simplify billing and account visibility.
- Identify alternative support options and features.
- Differentiate the pricing and performance of Amazon Web Services, Microsoft Azure and Google Cloud Platform.
- Have a good understanding of Amazon EC2, Core Services of AWS, Azure Virtual Machines and Google Compute Engine.
- Review the purpose of Amazon Block Storage (EBS), Azure Managed Disks and Google Compute Engine Persistent Disks.
- Understand the Amazon Simple Storage Service (S3), Azure Blob Storage and Google Cloud Storage services.
- Explore the Amazon Elastic File System (EFS), Azure File Storage and File Servers on Compute Engine.
- Review the Amazon Glacier, Azure Archive Blob Storage and Google Cloud Storage Nearline services.
- Understand virtual networking in the cloud with Amazon VPC, Azure Virtual Networks (VNetS) and GCP Virtual Private Cloud.
- Explore different relational database services across different providers like Amazon Relational Database Service, SQL Database and Google Cloud SQL.
- Explore Non-relational database services Amazon DynamoDB, Table Storage, Google Cloud Datastore and Google Cloud Bigtable.
- Understand the idea behind Amazon Route 53, Azure DNS, and Google Cloud DNS.
- Review key services like AWS Lambda, Azure Functions and Google Cloud Functions.

**Supported Student Outcomes at the Program Level**

- **SO1** An ability to analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
- **SO2** An ability to design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program’s discipline.

**Textbooks**

- Also, students are required to download and read all reading assignments as specified in the weekly assignment under the Course Content.
- Students are required to watch the LinkedIn learning videos embedded in the modules for clear understanding of the services provided by Microsoft Azure and Google Cloud Platform.

**Grading**

Grades will be awarded in accordance with the GMU Grading System for undergraduate students. See [http://catalog.gmu.edu/policies/academic/](http://catalog.gmu.edu/policies/academic/) under Grading for more information.

**Letter grades will be assigned according to the following scale:**

<table>
<thead>
<tr>
<th>Numeric Score</th>
<th>Letter Grade</th>
<th>Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>97 – 100</td>
<td>A+</td>
<td>Passing</td>
</tr>
<tr>
<td>93 – 96</td>
<td>A</td>
<td>Passing</td>
</tr>
<tr>
<td>90 – 92</td>
<td>A–</td>
<td>Passing</td>
</tr>
<tr>
<td>87 – 89</td>
<td>B+</td>
<td>Passing</td>
</tr>
<tr>
<td>83 – 86</td>
<td>B</td>
<td>Passing</td>
</tr>
<tr>
<td>80 – 82</td>
<td>B–</td>
<td>Passing</td>
</tr>
<tr>
<td>76 – 79</td>
<td>C+</td>
<td>Passing</td>
</tr>
<tr>
<td>73 – 76</td>
<td>C</td>
<td>Passing</td>
</tr>
<tr>
<td>Grades</td>
<td>Passing*</td>
<td></td>
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<tr>
<td>--------</td>
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<td></td>
</tr>
<tr>
<td>C-</td>
<td>70 – 72</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>60 – 69</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>0 – 59</td>
<td></td>
</tr>
</tbody>
</table>

* Grades of "C-" and "D" are considered passing grades for undergraduate courses. However, a minimum grade of "C" is required in the BSIT program for any course that is a prerequisite for one or more other courses.

**Final grades will be determined based on the following components:**

<table>
<thead>
<tr>
<th>Component</th>
<th>Weightage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments</td>
<td>100%</td>
</tr>
<tr>
<td>Homework and lab assignments</td>
<td>30%</td>
</tr>
<tr>
<td>Discussion Board</td>
<td>5%</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>20%</td>
</tr>
<tr>
<td>Midterm Project</td>
<td>5%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>25%</td>
</tr>
<tr>
<td>Quizzes</td>
<td>15%</td>
</tr>
</tbody>
</table>

Raw scores may be adjusted by the Instructor to calculate final grades. Students will be provided with six bonus lab assignments with an additional weightage of 5% designed in Microsoft Azure and Google Cloud Platforms to boost their grades.

These components are outlined in the following sections.

**Homework and lab assignments:**

Throughout the term students will be assigned homework or lab assignments to practice concepts learned. Upon completion, students will be required to submit completed work to Blackboard to receive credits. Each assignment will be released for viewing 7 days prior to the due date. Late homework assignment will not be accepted – if accepted, a penalty will be applied. Late submission will not be accepted under any circumstances if it is submitted 7 days after the due date. Acceptance of late homework/lab assignment will be at the sole discretion of the Instructor. Emailed homework/lab assignment are not accepted.

While students are encouraged to discuss solutions to homework/lab assignment and project problems, each student must submit their own, original, work. Students are expected to abide by the George Mason University Honor System and Code (which contains a definition of plagiarism, amongst other things). Further related information is available from IEEE, ACM.

Note that we reserve the right to submit student homework/lab assignment and projects for automated testing against other submitted projects to confirm a submission’s originality.

**Quizzes:**
The quizzes will cover materials discussed during last lectures and will be conducted in Blackboard. These quizzes will be “closed book” – no reference materials will be permitted.

**Midterm Exam:**
The midterm exam will cover materials discussed up to week 7. This exam will be “closed book” – no reference materials will be permitted.
Final Exam:
The final exam will cover materials discussed primarily after week 7. The final exam will be “closed book” – no reference materials will be permitted. Final exams are retained by the IST Department and are not returned to students.

Communications

Registered students will be given access to a section of Blackboard Learning System for this course. Blackboard will used as the primary mechanism (outside of lectures) to disseminate course information, including announcements, lecture slides, homework and other assignments, and scores for homework and exams.

Communication with the Instructor on issues relating to the individual student should be conducted using GMU email, via telephone, or in person - not in the public forums on Blackboard. Email is the preferred method. Federal privacy law and GMU policy require that any communication with a student related in any way to a student's status be conducted using secure GMU systems – if you use email to communicate with the Instructor you MUST send messages from your GMU email account.

Lecture slides are complements to the lecture process, not substitutes for it - access to lecture slides will be provided in Blackboard as a courtesy to students provided acceptable attendance is maintained.

All course materials (lecture slides, assignment specifications, etc) are published on Blackboard. This allows users of most computing platforms to view and print these files. Microsoft® Word (or a compatible word processing application) is required for preparing assignments – it is available on computers in the Mason open labs.

Privacy

Instructors respect and protect the privacy of information related to individual students. As described above, issues relating to an individual student will discussed via email, telephone or in person. Instructors will not discuss issues relating to an individual student with other students (or anyone without a need to know) without prior permission of the student.

Assessable work will be returned to individual students directly by the Instructor (or by a faculty or staff member or a Teaching Assistant designated by the Instructor, or via another secure method). Under no circumstances will a student's graded work be returned to another student. Faculty and staff will take care to protect the privacy of each student's scores and grades.

Disability Accommodations

The Office of Disability Services (ODS) works with disabled students to arrange for appropriate accommodations to ensure equal access to university services. Any student with a disability of any kind is strongly encouraged to register with ODS as soon as possible and take advantage of the services offered.
Accommodations for disabled students must be made in advance – ODS cannot assist students retroactively, and at least one week's notice is required for special accommodations related to exams. Any student who needs accommodation should contact the Instructor during the first week of the semester, so the sufficient time is allowed to make arrangements.

**Honor Code**

All members of the Mason community are expected to uphold the principles of scholarly ethics. Similarly, graduating students are bound by the ethical requirements of the professional communities they join. The ethics requirements for some of the communities relevant to IT graduates are available via the following links:

- ACM Code of Ethics and Professional Conduct
- IEEE Code of Ethics
- EC-Council Code of Ethics

On admission to Mason, students agree to comply with the requirements of the Honor Code at George Mason University. Student members of the George Mason University community pledge not to cheat, plagiarize, steal, and/or lie in matters related to academic work. The Honor Code will be strictly enforced in this course.

Any use of the words or ideas of another person(s), without explicit attribution that clearly identifies the material used and its source in an appropriate manner, is plagiarism and will not be tolerated. The Instructor reserves the right to use manual and/or automated means (including such services as Turnitin.com) to detect plagiarism in any work submitted by students for this course, and to direct Teaching Assistants and/or other faculty and/or staff members to do likewise in support of this course.

**Academic Integrity**

Students must be responsible for their own work, and students and faculty must take on the responsibility of dealing explicitly with violations. The tenet must be a foundation of our university culture. See Academic Integrity.

**Family Educational Rights and Privacy Act (FERPA)**

The Family Educational Rights and Privacy Act of 1974 (FERPA), also known as the "Buckley Amendment," is a federal law that gives protection to student educational records and provides students with certain rights. See the Registrar's Office.

**Religious Holidays**

A list of religious holidays is available on the University Life Calendar page. See the Religious Holiday Calendar. Any student whose religious observance conflicts with a scheduled course activity must contact the Instructor at least 2 weeks in advance of the conflict date in order to make alternative arrangements.
Students are expected to follow courteous Internet etiquette.