Syllabus

Section DL1: Asynchronous Distance Learning Section *
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Course Description

**IT Information Technology**

**451 Cloud Services Management (3:3:0)** This course covers the fundamentals of building IT infrastructure on cloud. The course is designed to teach solutions architects how to optimize their use of the cloud by understanding different services and how they fit into cloud-based solutions. Although architectural solutions can differ depending on the industry, type of application, and size of the business, this course emphasizes best cloud practices that apply to all of them. It also recommends various design patterns to help you think through the process of architecting optimal IT solutions on cloud platforms. Throughout the course, students will explore case studies that showcase how some cloud customers have designed their infrastructures and the strategies and services that they have implemented. Finally, this course provides opportunities for students to build a variety of infrastructures through a guided, hands-on approach.

Prerequisites

The pre/co-requisites for this course are IT 441. 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 how cloud adoption transforms the way IT systems work
- Describe the benefits of cloud computing with Amazon Web Services
- Discuss how to design systems that are secure, reliable, high-performing, and cost efficient
- Describe principles to consider when migrating or designing new applications for the cloud
- Identify the design patterns and architectural options applied in a variety of use cases
- Define high availability, fault tolerance, and scalability
- Discuss how to avoid single points of failure
- List AWS services that have built-in fault tolerance or can be designed for fault tolerance
- Describe why load balancing is a key architectural component for AWS-powered applications
- Identify the benefits of Infrastructure as Code
- Describe how to leverage the capabilities of AWS to support automation
- Create, manage, provision, and update related resources using AWS CloudFormation
- Articulate the importance of making systems highly cohesive and loosely coupled
- Describe system coupling to support the distributed nature of applications built for the cloud
- Describe database services for storing and deploying web-accessible applications
- Compare structured query language (SQL) databases with NoSQL databases
- Describe how the AWS Well-Architected Framework improves cloud-based architectures
- Describe the business impact of design decisions
- Identify the design principles and best practices of the Operational Excellence pillar
- Describe how to secure data at every layer in the application
- Describe the appropriate tools and services to provide security-focused content
- Describe the design principles and best practices of the Reliability pillar.
- Select compute, storage, database, and networking resources to improve performance
- Evaluate the most important performance metrics for your applications
- Follow best practices to eliminate unneeded costs or suboptimal resources

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


- **Computer and Technical Requirements:** Familiarity with systems operations, Linux operating systems, and basic computer networking knowledge is helpful in understanding the technologies covered.

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>Pass/Fail</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>77 – 79</td>
<td>C+</td>
<td>Passing</td>
</tr>
<tr>
<td>73 – 76</td>
<td>C</td>
<td>Passing</td>
</tr>
<tr>
<td>70 – 72</td>
<td>C–</td>
<td>Passing*</td>
</tr>
<tr>
<td>60 – 69</td>
<td>D</td>
<td>Passing*</td>
</tr>
<tr>
<td>0 – 59</td>
<td>F</td>
<td>Failing</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>Assignments</th>
<th>100%</th>
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</thead>
<tbody>
<tr>
<td>Lab assignments</td>
<td>35%</td>
</tr>
<tr>
<td>Discussion Board</td>
<td>5%</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>20%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>20%</td>
</tr>
<tr>
<td>Quizzes</td>
<td>15%</td>
</tr>
<tr>
<td>Homework/Exercise</td>
<td>5%</td>
</tr>
</tbody>
</table>

*These components are outlined in the following sections.*
Homework and lab assignments:

Throughout the term students will be assigned homework or lab assignments in order to practice concepts learned. Upon completion, students will be required to submit completed work to Blackboard in order 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 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.

Project:
In this project, students will have the opportunity to experience a simulated customer experience depicting a customer’s move from a traditional environment to a cloud solution.

Communications

Registered students will be given access to a section of the 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.