Syllabus

Course Description

IT  Information Technology
461  Application Development in Cloud (3:3:0)  Prerequisites: IT 106 or 109 and 214; or permission of instructor. Introduces techniques for developing applications to take advantage of availability, security, performance, and scalability of the cloud. Students will learn the serverless framework and deploy and test serverless applications on a cloud platform.

Prerequisites

The pre/co-requisites for this course are IT 106 or 109 and 214 (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 Outcomes

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

− Understand core cloud services, uses, and basic cloud computing architecture best practices
− Develop, deploy, and test serverless applications on a cloud platform
− Develop cloud-based solutions using security best practices

Supported Student Outcomes at the Program Level

− 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.
− SO4 An ability to recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.

Major Topics and Schedule

Thanksgiving Recess: Wed Nov 25 - Sun Nov 29, 2020

<table>
<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Content</th>
<th>Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>08/24</td>
<td>Welcome to Application Development in Cloud</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>AWS Overview</td>
<td></td>
</tr>
<tr>
<td>Week</td>
<td>Date</td>
<td>Topic</td>
<td>Assignment due</td>
</tr>
<tr>
<td>------</td>
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</tr>
</tbody>
</table>
| 2    | 08/31  | Introduction to Developing on AWS  
Introduction to AWS Cloud9 | Lab 1 Assigned  
DUE: 09/06 11:59PM                |
| 3    | 09/07  | Introduction to AWS IAM                                                |                                     |
| 4    | 09/14  | Develop storage solutions with Amazon S3                              | Lab 2 Assigned  
DUE: 09/20 11:59PM                |
| 5    | 09/21  | Develop NoSQL Solutions with Amazon DynamoDB                          | Lab 3 Assigned  
DUE: 09/27 11:59PM                |
| 6    | 09/28  | Cache information for scalability with Amazon CloudFront and Amazon ElastiCache |                                     |
| 7    | 10/05  | Introduction to Containers (e.g., Docker)                             | Lab 4 Assigned  
DUE: 10/11 11:59PM                |
| 8    | 10/12  | Develop solutions with Amazon SQS and Amazon SNS                      |                                     |
| 9    | 10/19  | Develop event-driven solutions with AWS Lambda                         | Project Assigned                     |
| 10   | 10/26  | Develop solutions with Amazon API Gateway                             | Lab 5 Assigned  
DUE: 11/01 11:59PM                |
| 11   | 11/02  | Develop solutions with AWS Step Functions                             |                                     |
| 12   | 11/09  | Develop secure applications on AWS                                    |                                     |
| 13   | 11/16  | Deploy applications on AWS                                            |                                     |
| 14   | 11/30  | Work on Project                                                       | Project  
DUE: 09/06 11:59PM                |
| 15   | 12/07  | Project Presentation & Course Wrap-up                                 | Project Presentation  
DUE: 12/13 11:59PM                |

Textbooks

- AWS Certified Developer Official Study Guide: Associate (DVA-C01) Exam  
- Instructor provided notes and online resources

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></td>
</tr>
<tr>
<td>93 – 96</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>90 – 92</td>
<td>A–</td>
<td></td>
</tr>
<tr>
<td>87 – 89</td>
<td>B+</td>
<td></td>
</tr>
<tr>
<td>83 – 86</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>80 – 82</td>
<td>B–</td>
<td></td>
</tr>
<tr>
<td>77 – 79</td>
<td>C+</td>
<td></td>
</tr>
<tr>
<td>73 – 76</td>
<td>C</td>
<td></td>
</tr>
</tbody>
</table>
Final grades will be determined based on the following components:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments</td>
<td>100%</td>
</tr>
<tr>
<td>Labs (5)</td>
<td>40%</td>
</tr>
<tr>
<td>Knowledge Checks (10)</td>
<td>20%</td>
</tr>
<tr>
<td>Project</td>
<td>30%</td>
</tr>
<tr>
<td>Project Presentation</td>
<td>10%</td>
</tr>
</tbody>
</table>

These components are outlined in the following sections.

Lab Assignments:

Throughout the term students will be assigned lab exercises in order to practice concepts learned. Each lab exercise will be conducted in the AWS Academy LMS, Canvas. Upon completion, students will be required to submit completed exercise screenshot(s) to Blackboard in order to receive credits. For more information about the lab assignments, check the “Lab Assignments” folder (under Assignments) on Blackboard. Lab assignments are always due at 11:59PM on the listed due date. Late submission will not be accepted.

Knowledge Checks:

There are 11 Knowledge Checks (quizzes) in total with the lowest grade being eliminated. Thus, only 10 Knowledge Checks count in the overall grade for the course. Each Knowledge Check is used to evaluate your mastery of terms and concepts taught in the same module. Each Knowledge Check will be conducted in the AWS Academy LMS, Canvas, and each student’s scores will be uploaded and recorded on Blackboard. Knowledge Checks are always due at 11:59PM on the listed due date. Late submission will not be accepted.

Project:

Students are required to individually design, build, publish, and submit a project in accordance with the requirements and present it (in the form of PowerPoint slides or a video recording). For more information about the project, check the Project folder (under Assignments) on Blackboard. Project and project presentation are due at 11:59PM on the listed due date. Late submission will not be accepted.
Hardware and Software Requirements

- **Hardware**
  - Access to a configurable and Internet-accessible computer capable of fully running Blackboard is required. This computer needs to be equipped with speakers or a headset. Availability of a microphone is recommended but its use throughout the semester will be limited.

- **Software**
  - PuTTY for learners who use Windows laptops or desktops
  - Remote Desktop for learners who use macOS laptops or desktops

- **Network**
  - Wi-Fi that can sustain a 5 Mbps connection, as measured by speedtest.net, and is accessible by each learner
  - Internet access. Any firewalls must be opened for outbound Remote Desktop Protocol (RDP) and Secure Shell (SSH) traffic, specifically TCP ports 3389 and 22.

Attendance Policy

Students are expected to attend each class, to complete any required preparatory work and to participate actively in lectures, discussions and exercises. As members of the academic community, all students are expected to contribute regardless of their proficiency with the subject matter.

Students are expected to make prior arrangements with Instructor if they know in advance that they will miss any class and to consult with the Instructor as soon as possible if they miss any class without prior notice. **Students who anticipate absences are discouraged from taking the class.**

Departmental policy requires students to take exams at the scheduled time and place, unless there are truly compelling circumstances supported by appropriate documentation. Except in such circumstances, failure to attend a scheduled exam will result in a score of zero (0) for that exam. Students should not make travel plans or other discretionary arrangements that conflict with scheduled classes and/or exams. If the University is closed due to weather or other unforeseen conditions, final exams may be rescheduled. Contact the instructor in advance if you have a serious problem that prevents you from meeting course requirements.

Classroom conduct

Students are expected to conduct themselves in a manner that is conducive to learning, as directed by the Instructor. Any student who negatively impacts the opportunity for other students to learn will be warned – if disruptive behavior continues, the student will be asked to leave the classroom.

Electronic devices are potential distractions in the classroom environment. Cell phones, pagers and other handheld devices must be turned off or set to "silent" mode and not used while class is in session. Laptop computers and similar devices may be used only if such use is directly related to the classroom activity in progress – for some activities the Instructor may require that such devices not be used in order to maximize student engagement.
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.