Cloud Computing Security (AIT 670)

Fall 2021. Online

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Office Address. Research Hall, Suite 417, Fairfax Campus.

Office hours. In person on Wednesdays, 1-3pm, or via Zoom by appointment. Emails received M-F will be responded within 48 hours.

CATALOG DESCRIPTION

This course offers a survey of security and privacy issues in Cloud Computing systems, along with an overview of current best practices and available technologies. The course examines the Cloud Computing model, the threat model, and security issues related to data and computation outsourcing, and explores practical applications of secure Cloud Computing.

COURSE GOALS

Upon successful completion of this course, students will:

- be familiar with the technology that enables and supports the effective use of Cloud Computing infrastructures;
- be familiar with an array of security and privacy issues in Cloud Computing systems, current best practices, and open problems;
- be familiar with legal and regulatory issues pertaining to Cloud Computing;
- have experience in discussing and writing about Cloud Computing and security related issues.

PREREQUISITES

Registration in MS AIT, AIT 660, or permission of instructor.

COURSE EXPECTATIONS

- Working online requires dedication and organization. Proper preparation is expected every week. Students are expected to log into the course each week, and review the materials and complete the assignments in a timely manner.
- Students must check their Mason email messages frequently for course announcements, which may include reminders, revisions, and updates.
- It is expected that students will familiarize themselves with and adhere to the Honor Code. Student members of the George Mason University community pledge not to cheat, plagiarize, steal, and/or lie in matters related to academic work.
- It is essential to communicate any questions or problems to the instructor promptly.

ONLINE LEARNING COMMUNITY

This online course is taught via Blackboard Courses (log into myMason, select the Courses Tab, and the course can be found in the Course List). This course is offered completely online. In our online learning community, we must be
respectful of one another. Please be aware that innocent remarks can be easily misconstrued. Sarcasm and humor can be easily taken out of context. When communicating, please be positive and diplomatic. You are encouraged to learn more about Netiquette.

**COURSE FORMAT**

The course will employ lectures, a mid-term exam to assess progress, and a final exam. Students will be required to write a technical paper on a topic which must be approved in advance by the instructor.

**TEXTBOOKS AND READING MATERIALS**

**Required Textbook**

- **Securing the Cloud**  
  *Vic (J.R.) Winkler*  
  ISBN: 978-1-59749-592-9  
  Syngress, 2011

The required textbook is available electronically through the O'Reilly Learning Platform (formerly Safari Books). You can access this book by following these steps:

- Go to [https://learning-oreilly-com.mutex.gmu.edu/home/](https://learning-oreilly-com.mutex.gmu.edu/home/) (you may be prompted to log in with your Mason credentials).
- Type the ISBN number (978-1-59749-592-9) or the title of the book into the search box and hit Enter, then click on the book title in the search results page.
- Click on the Start Reading button to open the book.
- You can also reach the O'Reilly Learning Platform through the University Libraries database search tool ([https://infoguides.gmu.edu/az.php?q=safari](https://infoguides.gmu.edu/az.php?q=safari)).

**Recommended Readings**

Recommended readings include publications from standardization bodies such as NIST, government agencies, and the research community. Below is a partial list of recommended readings.

- “Amazon Web Services: Overview of Security Processes,” Amazon, March 2020

Additional readings and lecture slides will be made available by the instructor through Blackboard.

**COURSE OUTLINE**

Below is an outline of the weekly modules. During Week 1, students are expected to familiarize with the course, the syllabus, and the tools available to them.

- **[Week 01 - 08-23-2021] - Introduction to the course**
- **[Week 02 - 08-30-2021] - Lecture 1: Introduction to cloud computing (Chapter 1)**
- **[Week 03 - 09-06-2021] - Lecture 2: Overview of networking concepts**
- **[Week 04 - 09-13-2021] - Lecture 3: Overview of security concepts**
- **[Week 05 - 09-20-2021] - Lecture 4: Cloud computing architecture (Chapter 2)**
- **[Week 06 - 09-27-2021] - Lecture 5: Security Concerns and legal aspects (Chapter 3)**
[Week 07 - 10-04-2021] - Lecture 6: Securing the cloud: architecture (Chapter 4)

[Week 08 - 10-11-2021] - Mid-term exam (available online from 10-15-2021 to 10-17-2021)

[Week 09 - 10-18-2021] - Lecture 7: Securing the cloud: data (Chapter 5)

[Week 10 - 10-25-2021] - Lecture 8: Securing the cloud: key strategies and best practices (Chapter 6)

[Week 11 - 11-01-2021] - Lecture 9: Security criteria: building an internal cloud (Chapter 7)

[Week 12 - 11-08-2021] - Lecture 10: Security criteria: selecting an external cloud provider (Chapter 8)


[Week 14 - 11-29-2021] - Lecture 12: Operating a cloud (Chapter 10)

[Week 15 - 12-06-2021] - Final exam (available online from 12-10-2021 to 12-12-2021)

**COURSE TOOLS**

The following tools will be used in this course.

- **Bb Blackboard**: used to post class materials (slides, readings, etc.), for discussions, and to grade individual class activities.
- Skype, Microsoft Team, Zoom: used for online appointments with the instructor.

**ADDITIONAL RESOURCES & INFORMATION**

Below is a list of additional and useful resources.

- University Catalog
- University Policy
- Office of Academic Integrity
- Mason Diversity Statement
- Student Privacy
- Writing Center
- Volgenau School Computing Resources
- DE Library Services
- Psychological Services and Counseling
- Calendar of Religious Holidays
- Disability Accomodations

Students with a documented learning disability or other condition that may affect academic performance should: (i) make sure this documentation is on file with Office of Disability Services (SUB I, Rm. 4205; phone: 703-993-2474) to determine the accommodations they need; and (ii) talk with the instructor to discuss their accommodation needs.

**GRADING POLICY**

Grading will be based on class participation, assignments, and exams. Points for course activities will accrue as follows:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class participation (discussion forums and access to class materials). Discussion forums close on the last day of class, <strong>12/04/2021</strong></td>
<td>150</td>
</tr>
<tr>
<td>Mid-term exam (available online from 12:00 am on 10-15-2021 to 11:59 pm on 10-17-2021)</td>
<td>150</td>
</tr>
<tr>
<td>Term paper, due <strong>12/06/2021</strong> (waived for students passing the CCSK or the CCSP between <strong>08/23/2021</strong> and <strong>12/06/2021</strong>)</td>
<td>150</td>
</tr>
<tr>
<td>Final exam (available online from 12:00 am on 12-10-2021 to 11:59 pm on 12-12-2021)</td>
<td>150</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>600</strong></td>
</tr>
</tbody>
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Final letter grades are assigned as follows:

<table>
<thead>
<tr>
<th>Point % range</th>
<th>Letter grade</th>
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<tbody>
<tr>
<td>97% - 100%</td>
<td>A+</td>
</tr>
<tr>
<td>93% - 96.9%</td>
<td>A</td>
</tr>
<tr>
<td>90% - 92.9%</td>
<td>A-</td>
</tr>
<tr>
<td>87% - 89.9%</td>
<td>B+</td>
</tr>
<tr>
<td>83% - 86.9%</td>
<td>B</td>
</tr>
<tr>
<td>80% - 82.9%</td>
<td>B-</td>
</tr>
<tr>
<td>70% - 79.9%</td>
<td>C</td>
</tr>
<tr>
<td>0% - 69.9%</td>
<td>F</td>
</tr>
</tbody>
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**Extra Credits.** Students who wish to recover credits lost in any course activity can volunteer to give short presentations (4-5 content slides, 8-10 minutes) on a topic of their choice. Each short presentation will earn up to 25 points, for a maximum of two presentations per student during the entire course. Students must notify the instructor in advance of their intention to prepare a short presentation. Topic of the presentation MUST be approved by the instructor. Presentations MUST be submitted as narrated PowerPoint slides through Blackboard, no later than December 4, 2021. No other extra credit opportunities beyond those mentioned here will be offered to students, unless otherwise announced by the instructor during the semester.

**Assignments.** Students will be held responsible for all material covered in class. Exams are administered during the dates specified in the syllabus. Failure to take any exam during the exam window or to submit an assignment by the due date will result in a score of zero, unless cleared in advance with the instructor and arranged for a makeup plan.

**Final Grades.** Final grades are non-negotiable, and cannot be disputed once posted. Any request to adjust grades after they have been posted will be denied unless there has been a factual error on the instructor’s side.