MARYLAND APPLIED GRADUATE ENGINEERING

Cloud Security (ENPM665)
Section AEB1

Term: *Summer/2026*
Professor: Thomas Dineen
Pronouns:
Office Phone:
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Office Thursday 7:00-8:30
Credits: 3.0
Course Dates: From Jun 1, 2026 – August 21, 2026
Course Times: Online
Classroom: Online

Teaching Assistant: N/A
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Email: N/A
Office Hours: TBD

Canvas/ELMS:

Course Description

Cloud Infrastructure as a Service (IaaS) has become a mainstay of the IT industry, providing tremendous value through on-demand, highly elastic, highly scalable, mission-critical enterprise applications and services. This course explores the high-level concepts involved in securing cloud computing resources including architecture concepts, design principles and patterns, best practices and industry standards that influence them. Additionally, it will address the impact that regulatory compliance plays in the design, implementation, and management of secure cloud-based services. This course also explores mechanisms used for identifying and mitigating risks, protecting data, and providing isolation of physical & logical resources that affect compute, network and storage cloud services. It also takes a comprehensive look at the critical role that Identity Management & Access Control, Monitoring and Auditing play in securing cloud resources and satisfying compliance, industry and regulatory mandates.

Students will learn and develop an understanding of the following:

● Fundamentals of cloud computing architectures based on current standards, protocols, and best practices for delivering Cloud-based enterprise IT services and business applications.

● Common threats, risks, vulnerabilities, and privacy issues associated with Cloud based workloads.

● Concepts and best practices for designing and implementing appropriate safeguards and countermeasures for Cloud-based workloads.

● Approaches to designing secure cloud workloads that leverage core cloud capabilities—including on-demand computing, shared resources, elasticity, and usage measurement—while ensuring data confidentiality, integrity, and availability through secure architecture principles and best practices

● Understand how industry security standards, regulatory mandates, audit policies, and compliance requirements impact Cloud-based workloads.

During the course, there will be a midterm group project and a final group project. Students will also perform hands-on exercises and assignments both during class and outside of class to reinforce the lecture material. While we will primarily focus on Infrastructure-as-a-Service (IaaS), we will also discuss Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS), specifically around security considerations for those services.

Prerequisites

Familiarity with cloud computing concepts is helpful but not required.

Learning Outcomes

After successfully completing this course, you will be able to:

- Understand how the Shared Responsibility Model applies to securing Infrastructure as a Service (IaaS)
- Demonstrate how to apply best practices to secure cloud-native workloads.
- Demonstrate how to use Identity and Access Management (IAM) in securing cloud resources.
- Demonstrate how to secure cloud resources using Multi-Factor Authentication (MFA)
- Demonstrate how to secure a workload deployed across a Multi-Cloud environment

Course Materials

Recommended Resources

This class covers a great deal of information about Cloud security technologies, so no single textbook can cover it all. Class notes will be provided for all topics covered. Below are two **optional textbooks** that the student may find helpful. In particular, the **CCSP Study Guide** provides a good overview of the topics covered in the class.

- **Book**: Malisow, Ben, **CCSP (ISC)2 Certified Cloud Security Professional Official Study Guide**, 3rd edition Sybex, 2019. ISBN: 978-1119909378 Technology
- **Book**: Vehent, Julien, **Securing DevOps**, Manning Publications, 2018. ISBN: 978-1617294136
- Total Estimated costs of required course materials: $70.00 for both books

Course Structure

This course includes an online section only. All lectures will be recorded and made available on ELMS-Canvas under **"Panopto Recordings/Video Lectures"** within 24 hours of the class time. Be sure to review the recorded lecture in a timely manner.

On-campus students come to class prepared to engage with the lecture and materials. Online students, be sure to log into Canvas regularly and participate in discussions and activities. Regardless of the section you are enrolled in, participation is expected.

Please note that F1 students enrolled in the on-campus section are required to attend in person. If you have a conflict on a particular day, please reach out to me in advance to discuss.

Communication Guidelines

Communicating with the Instructor

My goal is to be readily available to you throughout the semester. I can be reached by email at tdineen@umd.edu. Please DO NOT email me with questions that are easily found in the syllabus or on ELMS-Canvas (e.g., When is this assignment due? How much is it worth? etc.), but please DO reach out about personal, academic, and intellectual concerns/questions.

While I will do my best to respond to emails within 24 hours, you will more likely receive email responses from me on Tuesdays and Thursdays from 8:00 to 10:00 PM EST.

When constructing an email to me please put "**ENPM 665 (Section 0101**): **Your Topic**" in the subject line. This will draw my attention to your email and enable me to respond to you more quickly.

Additionally, please review These tips for 'How to email a professor'. By following these guidelines, you will be ensured to receive a timely and courteous response.

Finally, if you need to discuss issues not appropriate for the classroom and/or an email, we can arrange to talk by phone, over Zoom, or in person. Send me an email asking for a meeting and we can set something up.

Announcements

I will send IMPORTANT messages, announcements, and updates through ELMS-Canvas. To ensure you receive this information in a timely fashion, make sure your email and announcement notifications (including changes in assignments and/or due dates) are enabled in ELMS-Canvas (How to change notification settings in CANVAS).
Log into our ELMs-Canvas course site at least once every 24-hour period to check your inbox and the Announcements page.

Names/Pronouns and Self-Identifications

The University of Maryland recognizes the importance of a diverse student body, and we are committed to fostering inclusive and equitable classroom environments. I invite you, if you wish, to tell us how you want to be referred to in this class, both in terms of your name and your pronouns (he/him, she/her, they/them, etc.). Keep in mind that the pronouns someone uses are not necessarily indicative of their gender identity. Visit trans.umd.edu to learn more.

Additionally, it is your choice whether to disclose how you identify in terms of your gender, race, class, sexuality, religion, and dis/ability, among all aspects of your identity (e.g., should it come up in classroom conversation about our experiences and perspectives) and should be self-identified, not presumed or imposed. I will do my best to address and refer to all students accordingly, and I ask you to do the same for all of your fellow Terps.

Communicating with your Peers

With a diversity of perspectives and experience, we may find ourselves in disagreement and/or debate with one another. As such, it is important that we agree to conduct ourselves in a professional manner and that we work together to foster and preserve a virtual classroom environment in which we can respectfully discuss and deliberate controversial questions. I encourage you to confidently exercise your right to free speech—bearing in mind, of course, that you will be expected to craft and defend arguments that support your position. Keep in mind, that free speech has its limit and this course is NOT the space for hate speech, harassment, and derogatory language. I will make every reasonable attempt to create an atmosphere in which each student feels comfortable voicing their argument without fear of being personally attacked, mocked, demeaned, or devalued.

Any behavior (including harassment, sexual harassment, and racially and/or culturally derogatory language) that threatens this atmosphere will not be tolerated. Please alert me immediately if you feel threatened, dismissed, or

silenced at any point during our semester together and/or if your engagement in discussion has been in some way hindered by the learning environment.

Netiquette Policy

Netiquette is the social code of online classes. Students share a responsibility for the course's learning environment. Creating a cohesive online learning community requires learners to support and assist each other. To craft an open and interactive online learning environment, communication has to be conducted in a professional and courteous manner at all times, guided by common sense, collegiality and basic rules of etiquette.

Grading

Grade Breakdown

Assignment	Percentage %
Homework	**40%**
Quizzes	**10%**
In-Class/Hands-on	**5%**
Mid-Term Team Project	**20%**
Final Team Project	**25%**
Total	**100%**

Course Assignments

Homework Assignments

Students will have 5 homework assignments that will focus on the following topics:

- AWS Account Setup
- Identity and Access Management Setup / Delegated Access
- IAM Enumeration
- VPC Peering
- HIPPA Compliance Audit

Quizzes

- Students will be provided with quizzes that reinforce concepts covered during lectures

In-Class Hands-On

- Students will be provided with in-class hands-on exercises that reinforce concepts covered during lectures including:
    - Creating IAM Groups and Adding Users
    - Building a Secure VPC Environment
    - Investigating AWS Breach with CloudWatch and IAM
    - Attacking Cloud: EC2 SSRF and IMDS Credential Exposure
    - Broken Bridge: Multi-Cloud CTF

Participation & Engagement

- Except for the hands-on exercises, students will not be graded on class participation; however, participation is highly encouraged. Lectures will leverage in-class discussion, group discussion boards, and interactive tools to enrich the student learning experience

Mid-Term Team Project

- Students will be assigned a midterm team project. The objective of the project is to identify security vulnerabilities for a sample cloud deployment and deliver security assessments.

Final Team Project

- Based upon the security assessment from the midterm, students will provide recommendations on how to mitigate the security vulnerabilities that were identified.

Grading of Assignments

All assignments will be graded according to a predetermined set of criteria (i.e., rubric) which will be communicated to students before the assignment is submitted.

To progress satisfactorily in this class, students need to receive timely feedback. To that end, it is my intention to grade all assignments within **one week** of their due date. If an assignment is taking longer than expected to grade, students will be informed of when they can expect to see their grade.

Grade Computation

All assessment scores will be posted on ELMS/Canvas page. If you would like to review any of your grades (including the exams), or have questions about how something was scored, please email me to schedule a time for us to meet and discuss.

It is expected that you will submit work by the deadline listed in the syllabus and/or on ELMS-Canvas. Late work will be penalized according to the late work policy described in the **Course Policies and Procedures** section below.

Grade Disputes: I am happy to discuss any of your grades with you, and if I have made a mistake, I will immediately correct it. Any formal grade disputes must be submitted in writing and within one week of receiving the grade.

Final letter grades are assigned based on the percentage of total assessment points earned. To be fair to everyone I have to establish clear standards and apply them consistently, so please understand that being close to a cutoff is not the same as making the cut (89.99 ≠ 90.00). It would be unethical to make exceptions for some and not others.

Final Grade Cutoffs

Letter Grade	Cutoff
A+	97%
A	94%
A-	90%
B+	87%
B	84%
B-	80%
C+	77%
C	74%
C-	70%
D+	67%
D	64%
D-	60%
F	<60%

Course Schedule

Week #	Topic	Deliverable
1	Introduction & Administrivia	Homework #1 issued Optional reading: CCSP book chapters 1, 5 , 6
2	Securing the Cloud – IaaS, PaaS, SaaS	
3	Designing and Redesigning Secure Applications for the Cloud	Homework #1 due Optional reading: CCSP book chapter 7
4	Identity and Access Management for the Cloud	Homework #2 issued Optional reading: CCSP book chapter 7
5	Protecting Data in the Cloud	Midterm Project issued Optional reading: CCSP book chapters 3, 4
6	Compliance in the Cloud	Homework #2 due Optional reading: CCSP book chapters 10, 11
7	Deep Dive: Amazon Web Services	Homework #3 issued
8	Deep Dive: Microsoft Azure	
9	Deep Dive: Google Cloud Platform	Homework #3 due Homework #4 issued
10	Incident Response and Forensics in the Cloud	
11	Vulnerability Scanning and Penetration Testing in the Cloud	Homework #4 due Homework 5 issued Final Project issued
12	Deep Dive: Securing SaaS Applications and **Course wrap up**	Homework #5 due

Note: This is a **tentative schedule**, **and subject to change** as necessary – **monitor ELMS-Canvas for current deadlines**. In the unlikely event of a prolonged university closing, or an extended absence from the university, adjustments to the course schedule, deadlines, and assignments will be made based on the duration of the closing and the specific dates missed.

Course Policies and Procedures

The University of Maryland's conduct policy indicates that course syllabi should refer to a webpage of course-related policies and procedures. For a complete list of graduate course related policies, visit the Graduate School website. Below are course-specific policies and procedures which explain how these Graduate School policies will be implemented in this class.

Satisfactory Performance

The Graduate School expects students to take full responsibility for their academic work and academic progress. The student, to progress satisfactorily, must meet all the academic requirements of this course. Additionally, each student is expected to complete all readings and any preparatory work before each class session, come to class prepared to make substantive contributions to the learning experience, and to proactively communicate with the instructor when challenges or issues arise.

Questions about Assignments

Please ask all questions you may have about an assignment **at least 24 hours BEFORE the assignment is due**. Any questions asked after that time may not be answered in time for you to make changes to your work.

Late Work Policy

Assignments should be completed by the due date and time listed with the assignment, on the syllabus, and/or in the course calendar. If you are unable to complete an assignment by the stated due date, it is your responsibility to contact your instructor to discuss an extension, at least 24 hours BEFORE the assignment is due. Extensions are not guaranteed but may be granted at the instructor's discretion.

Assignments submitted late will receive a 10% deduction in total grade per each calendar day late up to a maximum of three days late (i.e., there is a maximum of a 30% grade reduction for assignments submitted late). Work submitted more than three days late will not receive feedback and will automatically earn a grade of zero. If your failure to turn your work in on time was due to a University excused absence, please contact your instructor and make-up work can be arranged.

Responsible Use of Generative AI

Generative AI tools (e.g., ChatGPT, GitHub Copilot, etc.) are becoming increasingly common in engineering education and in the workplace. In this course, students are expected to use AI technologies ethically and in ways that support learning, uphold academic integrity, and align with course objectives. Students are encouraged to use AI to enhance understanding of the course material and reinforce core concepts. Students will be required to demonstrate their understanding of concepts through a series of projects, hands-on exercises, and demos.

Permitted Uses of AI Tools in This Course

Students may use generative AI tools for the following purposes:

- *Brainstorming initial ideas or outlining for assignments*
- *Getting help understanding difficult engineering concepts (e.g., asking for explanations or examples)*
- *Writing assistance at the sentence level (e.g., grammar or clarity improvements)*
- *Debugging support in coding assignments, provided students still understand and can explain their code*

Prohibited Uses of AI Tools in This Course

Students may not use generative AI tools for:

- *Completing graded assignments, problem sets, or projects unless explicitly permitted*
- *Generating solutions to coding or engineering problems without understanding and verifying the output*
- *Writing full sections of reports, papers, or lab assignments*
- *Submitting AI-generated work as their own without proper citation or instructor approval*

It is the student's responsibility to make sure any use of AI aligns with the expectations outlined above. Misuse of AI tools may constitute academic dishonesty and will be addressed accordingly (see section on academic integrity, below). Lastly, please become familiar with the University-approved AI tools and university guidelines on responsible AI use. If you are unsure whether a particular use of AI is appropriate, please ask before proceeding.

Academic Integrity

For this course, some of your assignments will be collected via Turnitin on ELMS/Canvas. I have chosen to use this tool because it can help you improve your scholarly writing and help me verify the integrity of student work. For information about Turnitin, how it works, and the feedback reports you may have access to, visit Turnitin Originality Checker for Students

The University's Code of Academic Integrity is designed to ensure that the principles of academic honesty and integrity are upheld. In accordance with this code, the University of Maryland does not tolerate academic dishonesty. Please ensure that you fully understand this code and its implications because all acts of academic dishonesty will be dealt with in accordance with the provisions of this code. All students are expected to adhere to this Code. It is your responsibility to read it and know what it says, so you can start your professional life on the right path. **As future professionals, your commitment to high ethical standards and honesty begins with your time at the University of Maryland.**

It is important to note that course assistance websites, such as CourseHero, or AI generated content are not permitted sources, unless the instructor explicitly gives permission. Material taken or copied from these sites can be deemed unauthorized material and a violation of academic integrity. These sites offer information that might be inaccurate or biased and most importantly, relying on restricted sources will hamper your learning process, particularly the critical thinking steps necessary for college-level assignments.

Additionally, students may naturally choose to use online forums for course-wide discussions (e.g., Group lists or chats) to discuss concepts in the course. However**, collaboration on graded assignments is strictly prohibited unless otherwise stated**. Examples of prohibited collaboration include: asking classmates for answers on quizzes or

exams, asking for access codes to clicker polls, etc. Please visit the **Office of Graduate Studies' full list of campus-wide policies** and reach out if you have questions.

Finally, on each exam or assignment you must write out and sign the following pledge: ***"I pledge on my honor that I have not given or received any unauthorized assistance on this exam/assignment."***

If you ever feel pressured to comply with someone else's academic integrity violation, please reach out to me straight away. Also, ***if you are ever unclear*** about acceptable levels of collaboration, ***please ask***!

To help you avoid unintentional violations, ***the following table*** lists levels of collaboration that are acceptable for each graded exercise. Each assignment will contain more specific information regarding acceptable levels of collaboration.

Assignment Type	 OPEN NOTES	 READ BOOK	 LEARN ONLINE	 GATHER CONTENT WITH AI	 ASK FRIENDS	 WORK IN GROUPS
Homework	Yes	Yes	Yes	No	No	No
Quizzes	Yes	Yes	Yes	No	No	No
Team Project	Yes	Yes	Yes	Yes	Yes	Yes
Final Project	Yes	Yes	Yes	Yes	Yes	Yes

Course Evaluation

Please submit a course evaluation through Student Feedback on Course Experiences in order to help faculty and administrators improve teaching and learning at Maryland. All information submitted to Course Experiences is confidential. Campus will notify you when Student Feedback on Course Experiences is open for you to complete your evaluations at the end of the semester. Please go directly to the **Student Feedback on Course Experiences** to complete your evaluations. By completing all of your evaluations each semester, you will have the privilege of accessing through Testudo the evaluation reports for the thousands of courses for which 70% or more students submitted their evaluations.

Religious Observance

It is the student's responsibility to inform the instructor of any intended absences for religious observances in advance. Notice should be provided as soon as possible but no later than the end of the schedule adjustment period.

Copyright Notice

Tips for Succeeding in this Course

1. **Participate.** I invite you to engage deeply, ask questions, and talk about the course content with your classmates. You can learn a great deal from discussing ideas and perspectives with your peers and professor. Participation can also help you articulate your thoughts and develop critical thinking skills.
2. **Manage your time.** Students are often very busy, and I understand that you have obligations outside of this class. However, students do best when they plan adequate time that is devoted to course work. Block your schedule and set aside plenty of time to complete assignments including extra time to handle any technology related problems.
3. **Login regularly.** I recommend that you log in to ELMS-Canvas several times a week to view announcements, discussion posts and replies to your posts. You may need to log in multiple times a day when group submissions are due.
4. **Do not fall behind.** This class moves at a quick pace and each week builds on the previous content. If you feel you are starting to fall behind, check in with the instructor as soon as possible so we can troubleshoot together. It will be hard to keep up with the course content if you fall behind in the pre-work or post-work.
5. **Use ELMS-Canvas notification settings.** Pro tip! Canvas ELMS-Canvas can ensure you receive timely notifications in your email or via text. Be sure to enable announcements to be sent instantly or daily.
6. **Ask for help if needed.** If you need help with ELMS-Canvas or other technology, IT Support. If you are struggling with a course concept, reach out to me and your classmates for support.

Student Resources and Services

Taking personal responsibility for your learning means acknowledging when your performance does not match your goals and doing something about it. I hope you will come talk to me so that I can help you find the right approach to success in this course, and I encourage you to visit the Counseling Center's Academic Resources to learn more about the wide range of resources available to you. Below are some additional resources and services commonly used by graduate students. For a more comprehensive list, please visit the Graduate School's Campus Resources Page.

Accessibility and Disability Services

The University of Maryland is committed to creating and maintaining a welcoming and inclusive educational, working, and living environment for people of all abilities. The University of Maryland is also committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs, or activities of the University, or be subjected to discrimination. The Accessibility & Disability Service (ADS) provides reasonable accommodations to qualified individuals to provide equal access to services, programs and activities. ADS cannot assist retroactively, so it is generally best to request accommodations several weeks before the semester begins or as soon as a disability becomes known. Any student who needs accommodations should contact me as soon as possible so that I have sufficient time to make arrangements.

For assistance in obtaining an accommodation, contact Accessibility and Disability Service at 301-314-7682, or email them at adsfrontdesk@umd.edu. Information about sharing your accommodations with instructors, note taking assistance and more is available from the Counseling Center.

Writing Center
Everyone can use some help sharpening their communication skills (and improving their grade) by visiting The Graduate School's Writing Center and schedule an appointment with them. Additionally, international graduate students may want to take advantage of the Graduate School's free English Editing for International Graduate Students (EEIGS) program.

Health Services
The University offers a variety of physical and mental health services to students. If you are feeling ill or need non-emergency medical attention, please visit the University Health Center.

If you feel it would be helpful to have someone to talk to, visit UMD's Counseling Center or one of the many other mental health resources on campus.

Notice of Mandatory Reporting
Notice of mandatory reporting of sexual assault, sexual harassment, interpersonal violence, and stalking: As a faculty member, I am designated as a "Responsible University Employee," and I must report all disclosures of sexual assault, sexual harassment, interpersonal violence, and stalking to UMD's Title IX Coordinator per University Policy on Sexual Harassment and Other Sexual Misconduct.

If you wish to speak with someone confidentially, please contact one of UMD's confidential resources, such as CARE to Stop Violence (located on the Ground Floor of the Health Center) at 301-741-3442 or the Counseling Center (located at the Shoemaker Building) at 301-314-7651.

You may also seek assistance or supportive measures from UMD's Title IX Coordinator, Angela Nastase, by calling 301-405-1142, or emailing titleIXcoordinator@umd.edu.
To view further information on the above, please visit the Office of Civil Rights and Sexual Misconduct.

Basic Needs Security
If you have difficulty affording groceries or accessing sufficient food to eat every day, or lack a safe and stable place to live, please visit UMD's Division of Student Affairs website for information about resources the campus offers you and let me know if I can help in any way.

Veteran Resources
UMD provides some additional supports to our student veterans. You can access those resources at the office of Veteran Student life and the Counseling Center. Veterans and active duty military personnel with special circumstances (e.g., upcoming deployments, drill requirements, disabilities) are welcome and encouraged to communicate these, in advance if possible, to the instructor.