MARYLAND APPLIED
GRADUATE ENGINEERING

ENPM818I Embedded Software Design and Optimization (0101, DE01) **Term:** Spring 2024

Professor: Dr. W. Lewis Collier
Pronouns: he/him
Office Phone: N/A
Email: lcollier@umd.edu
Office Hours: Monday (before class) & by appt.

Credits: 3
Course Dates: From 29 January 2023 – 06 May 2023
Course Times: Monday 7:00 - 9:40 pm and Online
Classroom: JMP TBD

Canvas/ELMS: https://umd.instructure.com/courses/1360108

Course Description

ENPM 818I covers the design and optimization of stable, maintainable, and secure embedded software systems. The main study topics include: Software engineering design and documentation artifacts; Information assurance and cybersecurity; CPU architectures, system components, and development tools; Operating system details; Programming models and tools; IO busses and networking protocols; and Low-level optimization techniques. Students will acquire not only technical knowledge, but also soft skills such as communication, collaborations, critical thinking, leadership, negotiation, and time management.

Prerequisites

- A good understanding of programming in C/C++ is required in order to access low-level hardware features of embedded system development.
- Knowledge of basic computer architecture concepts is expected but details of embedded hardware will be provided in the class.

Learning Outcomes

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

- Capture design and security concerns of embedded systems to support development and maintainability.
- Understand the importance of CPU architecture and support hardware on embedded system performance.
- Select and utilize an optimal programming model to develop an extensible and sustainable embedded system.
- Develop embedded system code to control multiple real-time IO devices.
- Communicate system design parameters to current collaborators, future maintainers, and other stakeholders.

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Course Materials

Required Resources

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- Books:

Embedded Software Design: A Practical Approach to Architecture, Processes, and Coding Techniques

  - Author: [Jacob Beningo](#)
  - First edition (2023).
  - **ISBN-13:** 978-1-4842-8278-6
- Hardware:

An embedded hardware and development kit of your choice. Kit must offer basic I/O functions such as UART or parallel, SPI or I2C, USB, Ethernet, and A/D or D/A ports.

  - Total Estimated costs of required course materials: $100.00

Course Structure

This course includes both on-campus and online sections. To attend synchronously online, log into ELMS-Canvas at the time of the Section 0101 class [Monday 7pm – 940pm] and select "Video Conference" from the left side menu. This will open a Zoom link to the live classroom.

For asynchronous online students, 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.

Each lecture period will be divided into three parts: Development topics, design topics, and in class work time. Development topics will explore aspects of embedded system hardware and software while the design topics will cover the necessary non-coding aspects of creating a well-designed and optimized embedded system. In class work time allows for working on assignments to allow for direct feedback from the instructor and peer learning from fellow classmates.

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.

The course is structured so that group efforts are used in the beginning of the course, with all learning assessment products to be completed by individual efforts. The intent is that the group members work together to get up to speed on the development tools and methodologies. Group collaboration is also encouraged for individual projects, but ALL work products are to be created as individual efforts. This ensures that all students wind up with a set of well-understood artifact templates for future use in all their design efforts.

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 lcollier@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 between 5pm and 9pm Monday through Thursday evenings.

When constructing an email to me please put "ENPM 818I (Section XXXX): 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.

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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 %	
Development Assignments (1 – 5) 6% each 30%	
Design Assignments :: Draft Artifacts 5% each (SDP, SVD, OCD, SPS, SSS, SSDD, STP, STS)	40%
Final Project 15%	
Final Presentation 15%	
Total	100%

Course Assignments

Coding Assignments
- These assignments provide examples of understanding of embedded development.

Draft Artifacts
- These draft design artifacts provide examples of understanding the framework for capturing design elements of an embedded system.

Final Project
- The final project provides evidence of capability to develop and document an embedded system.

Final Presentation
- The final presentation provides experience and demonstration of the ability to convey details of a complicated system development effort.

Grading 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 **a week from** 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 weighted percentage of total assessment points earned. Final grades will be tabulated from the weighted averages, rounding upwards from fractional values. Thus, an average of 97.00 would equate to a letter grade of A and an average of 96.99 would equate to a letter grade of A-. 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 this as making the cut ($96.99 \neq 97.00$). It would be unethical to make exceptions for some and not others.

Final Grade Cutoffs		
+ 97.00% + 87.00% + 77.00% + 67.00% + A 94.00% B 84.00% C 74.00% D 64.00% F -		
90.00% - 80.00% - 70.00% - 60.00% -		<60.0%

Course Schedule

Week	**All**
Part one of each week will focus on embedded software development details.	
Part two of each week will focus on embedded software design topics. (following chapters in Embedded Software Design, Jacob Beningo, ISBN 978-1-4842-8278-6)	
Each week will provide in-class time for working on assignments to allow for direct feedback from the instructor and peer learning from fellow classmates.	

Week 1	29 Jan 2024

Before Class
  a) Read Beningo Chapter 1
  b) Get familiar with your embedded development kit
  c) Get LaTeX up and running on your computer

Development Topics :: Intro to Embedded Systems and CPU
  Architectures a) Embedded system examples
  b) Fundamentals of Computer Architectures ("Betty Bit" Lecture)
        i. CPU types (RISC/CISC), instruction sets, architectures, 8/16/32/64 bits
       ii. Multiprocessor cores, network interfaces, GPIO, A/D, Comms IO
      iii. Memory types (ROM, RAM, NVRAM, etc.)
       iv. Power constraints (sleep modes, etc.)

Development Assignment 1
  a) Get embedded system development system and tools up and running.
  b) Make sure to keep records of installation and setup information so it can be placed
      in the SDP and SVD artifacts.

Design Topics
  a) Embedded Software Design Philosophy (Beningo Ch 1)
  b) Overview of MIL-STD-498 Data Item Descriptions (DIDS)
  c) System Development Plan (SDP) and System Version Description (SVD) Artifacts

Design Assignment 1a:
  a) Create initial drafts of SDP and SVD design artifacts. This is to make sure
      LaTeX and templates are up and running.
  b) Place appropriate setup information in SDP and SVD artifacts.

After Class:
  a) Read Beningo Chapters 7 & 15
  b) Begin work on and *Complete* Development Assignment 1
  c) Begin work on Design Assignment 1a

Week 2	05 Feb 2024

Before Class:
  a) Read Beningo Chapters 7 & 15
  b) *Complete* Development Assignment 1
  c) Continue work on Design Assignment 1a

Development Topics :: Tools
a) C/C++ programming b) Version Control (GIT/SVN) c) IDEs, Compilers, Assembler, Linker d) Debugger (inc. JTAG), Emulator

Development Assignment 1: *Due.*
Development Assignment 2: Demonstrate use of debugger and emulator tools.
 	
Design Topics
  a) Embedded DevOps (Beningo Ch 7).
  b) Right Tools for the Job (Beningo Ch 15).

Design Assignment 1b: Update initial drafts of design artifacts SDP and SVD with information from development assignment.
After Class: a) Read Beningo Chapters 2 & 5 b) Begin work on Development Assignment 2 c) *Complete w*ork on Design Assignment 1b

Week 3	12 Feb 2024
Before Class: a) Read Beningo Chapters 2 & 5 b) Continue work on Development Assignment 2 c) *Complete* Design Assignment 1b	
Development Topics :: IO Busses a) Universal Asynchronous Receiver/Transmitter (UART) & Parallel b) Universal Serial Bus (USB) c) Inter-Integrated Circuit (I2C) & Serial Peripheral Interface (SPI) d) Controller Area Network (CAN) & SAE J1587/J1708 e) Firewire & Bluetooth	
Development Assignment 2: Continue	
Design Topics a) Embedded Software Architecture Design (Beningo Ch 2). b) Design Patterns (Beningo Ch 5). c) Diagrams (UML, DataFlow, Use Cases, etc.) d) Operational Concept Description (OCD) & System Performance Specification (SPS)	
Design Assignment 1 : *Due.* **Design Assignment 2**: Creation of initial draft of OCD and SPS design artifacts	

After Class:
 a) Read Beningo Chapter 4
 b) Continue work on Development Assignment 2
 c) Begin work on Design Assignment 2

Week 4	19 Feb 2024

Before Class:
 a) Read Beningo Chapter 4
 b) *Complete* work on Development Assignment 2
 c) Continue work on Design Assignment 2

Development Topics :: Operating Systems
 a) Operating Systems
  i. General
  ii. File Systems
  iii. Virtualization
  iv. Dockers
  v. Embedded
 b) Real Time
  i. Interrupt Handling
  ii. Context Switching
  iii. Other RT Considerations
 c) Bare Metal

Development Assignment 2: *Due*
Development Assignment 3: Development of multiple I/O streams with interrupt handling

Design Topics
 a) RTOS Application Design (Beningo Ch 4).

Design Assignment 2: Continue.

After Class:
 a) Read Beningo Chapter 3
 b) Begin work on Development Assignment 3
 c) *Complete* work on Design Assignment 2

Week 5	26 Feb 2024

Before Class:
 a) Read Beningo Chapter 3
 b) Continue work on Development Assignment 3
 c) *Complete* work on Design Assignment 2

Development Topics :: Intro to Cybersecurity   a) Risk Management Framework
Development Assignment 3: Continue.

Design Topics
    a) Secure Application Design (Beningo Ch 3).
    b) System / Subsystem Specification (SSS, Triple-S)
 	
Design Assignment 2: *Due.*
Design Assignment 3: Creation of initial draft design artifact SSS.

After Class:
    a) Read Beningo Chapters 12 & 14
    b) *Complete* work on Development Assignment 3
    c) Begin work on Design Assignment 3

Week 6	**04 Mar 2024**

Before Class:
    a) Read Beningo Chapters 12 & 14
    b) *Complete* work on Development Assignment 3
    c) Continue work on Design Assignment 3

Development Topics :: Programming Models and Hardware
    a) Programming Models
        i. Monolithic
        ii. Multi-threaded
        iii. Multi-process
    b) Programming Hardware
        i. Status Registers
        ii. Clocks (crystals, clock lines, PLLs, etc.)
        iii. Interrupts / ISRs
        iv. Timers / Watchdogs
        v. Semaphore / mutex / spinlock
        vi. Shared Memory
        vii. Critical Sections

Development Assignment 3: *Due* **Development Assignment 4**: extension of basic app with security measures

Design Topics
    a) Interfaces, Contracts, and Assertions (Beningo Ch 12).
    b) Comms, Command Processing, and Telemetry Techniques (Beningo Ch 14).

Design Assignment 3: Continue

After Class:
    a) Read Beningo Chapter 13
    b) Begin work on Development Assignment 4
    c) *Complete w*ork on Design Assignment 3

Week 7	11 March 2024

Before Class:
    a) Read Beningo Chapter 13
    b) Continue work on Development Assignment 4
    c) *Complete w*ork on Design Assignment 3

Development Topics :: Device Drivers and Function Types
    a) Device Drivers
    b) Function (Method) Types
        i. Reentrant
        ii. Recursive
        iii. Infinite loops

Development Assignment 4: Continue

Design Topics
    a) Configurable Firmware Techniques (Beningo Ch 13).
    b) System / Subsystem Design Description (SSDD).

Design Assignment 3: *Due.*
Design Assignment 4: Creation of initial draft design artifact SSDD.

After Class:
    a) Read Beningo Chapter 9
    b) Continue work on Development Assignment 4
    c) Begin work on Design Assignment 4

Week 8	18 Mar 2024

SPRING BREAK :: No class
    a) Continue work on Development Assignment 4
    b) Continue work on Design Assignment 4
    c) Conclude idea generation and define scope for final project

Week 9	25 Mar 2024

Before Class:
a) Read Beningo Chapter 9
b) *Complete w*ork on Development Assignment 4
c) Continue work on Design Assignment 4

Development Topics :: Networking
    a) Networking
         i. OSI Model
        ii. TCP
        iii. UDP
        iv. MAC
        v. Physical Layer

Development Assignment 4: *Due*
Development Assignment 5: Development of Network TCP and UDP speed tester.

Design Topics
       a. Application Modeling, Simulation, and Deployment (Beningo Ch 9).

Design Assignment 4: Continue

After Class:
    a) Read Beningo Chapter 11
    b) Begin work on Development Assignment 5
    c) *Complete w*ork on Design Assignment 4

Week 10	01 April 2024

Before Class:
    a) Read Beningo Chapter 11
    b) Continue work on Development Assignment 5
    c) *Complete w*ork on Design Assignment 4

Development Topics :: Final Project, TBD (makeup)
    a) Final Project Assignment Discussion
    b) TBD

Development Assignment 5: Continue

Design Topics
    a) Selecting Microcontrollers (Beningo Ch 11).
    b) System Test Plan (STP) and System Test Specification [Description] (STS)

Design Assignment 4: *Due*.
Design Assignment 5: Creation of initial draft design artifacts STP and STS.

After Class:
    a) Read Beningo Chapter 8

b) *Complete w*ork on Development Assignment 5
c) Begin Work on Design Assignment 5

Week 11	**08 April 2024**

Before Class:
    a) Read Beningo Chapter 8
    b) *Complete w*ork on Development Assignment 5
    c) Continue Work on Design Assignment 5

Development Topics :: Embedded System Challenges
    a) Embedded System Challenges
        i. Stability
        ii. Safety
        iii. Time to Market / Pace of Change
        iv. Design Limitations
    b) Verification and Validation
    c) Compatibility and Integrity

Development Assignment 5: *Due*

Design Topics
    a) Testing, Verification, and Test-Driven Development (Beningo Ch 8).

Design Assignment 5: Continue

After Class:
    a) Read Beningo Chapter 10
    b) *Complete w*ork on Design Assignment 5
    c) Begin work on Final Project

Week 12	**15 Apr 2024**

Before Class:
    a) Read Beningo Chapter 10
    b) *Complete w*ork on Design Assignment 5
    c) Continue work on Final Project

Development Topics :: User Interfaces
    a) Qt
    b) wxWidgets
    c) Command Line Interface (CLI)

Development Assignment: Start Final Project -- develop a student-selected
embedded system and create documentation artifacts for it.

Design Topics
a) Jump-Starting Software Development to Minimize Defects (Beningo Ch 10). **Design Assignment 5**: _**Due**_.

After Class:
a) Read Beningo Chapter 6   b) Continue work on Final Project

Week 13	22 Apr 2024

Before Class:
a) Read Beningo Chapter 6   b) Continue work on Final Project

Development Topics :: Optimization Topics
a) Loop count direction   b) Register Allocation   c) Data Layouts   d) Data/Code Compaction

Development Assignment: Final Project: Continue

Design Topics
a) Software Quality, Metrics, and Processes (Beningo Ch 6).

Design Assignment: Start Final Project -- develop a student-selected embedded system and create documentation artifacts for it.

After Class:
a) Continue work on Final Project

Week 14	29 Apr 2024

Before Class:
a) Continue work on Final Project

Development Topics
a) Makeup week for snow days, etc.   b) TBD (Final Project Q&A)

Development Assignment: Final Project: Continue

Design Topics
a) Makeup week for snow days, etc.   b) TBD (Final Project Q&A)

Design Assignment: Final Project: Continue
After Class: a) Complete Final Project

Week 15	06 May 2024
Before Class: a) Complete Final Project	
Final Project Presentations (**Final presentation and artifacts due for all students**)	

After Class:
    a) Relax
    b) Finish the semester strong in your other courses!	

Note: This is a tentative schedule, and subject to change as necessary due to weather delays, number of final presentations, etc. 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.

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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.

Classroom Technology

I expect you to make the responsible and respectful decision to refrain from using your cellphone during class time. If you have critical communication to attend to, please excuse yourself and return when you are ready. For more information about the science behind the policy watch:

http://youtu.be/WwPaw3Fx5Hk

Likewise, as I do not expect students to be buried in their computers, this will not be a PowerPoint presentation-centric course. I will use slides to highlight topics, and data sets, but I will not be reading them to you. I expect students to have read the material before the class so that in-depth discussions can be had during class. As stated above, the overarching goal of this class is to provide an

understanding of embedded systems design and optimization. Hands on practice will lead to a better understanding when real systems are developed, but discussion beforehand will afford the base understanding that enables the deeper comprehension when development is performed and design artifacts are created.

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 by 9:00 PM the Friday before the assignment due date (which is usually Monday at start of class). 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 without an approved extension 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 without an approved extension will not receive feedback and will automatically earn a grade of zero.

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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.

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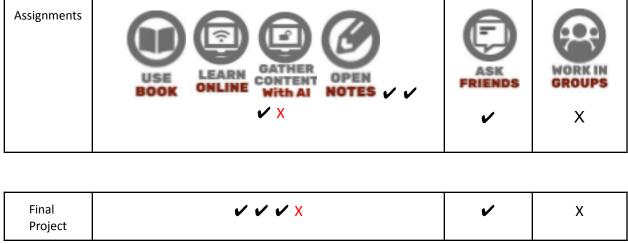
If you ever feel pressured to comply with someone else's academic integrity violation, please reach out to me straight away. Also, ***if you are ever unclear*** about acceptable levels of collaboration, ***please ask***!

To help you avoid unintentional violations, ***the following table*** lists levels of collaboration that are acceptable for each graded exercise.

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Assignments	USE BOOK	LEARN ONLINE	GATHER CONTENT With AI ✔ X	OPEN NOTES ✔ ✔	ASK FRIENDS ✔	WORK IN GROUPS X

Final Project	✔ ✔ ✔ X				✔	X

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.

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's website at ocrsm.umd.edu.

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. and Optimization 2024-

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