

Course Syllabus

EMBEDDED SYSTEMS (ENPM615)

Sections 0101 and EB01

Term: *Fall/2026*

Professor: Manoj Franklin

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Email: manoj@umd.edu

Office Hours: By Appointment.

Teaching Assistant: TBD

Email: ###

Office Hours: ###

Credits: 3

Course Dates: From 31 Aug. 2026 - 18 Dec, 2026

Course Times: Tue 4:00pm-6:40pm

Classroom: JMP 2216

Canvas/ELMS: <https://umd.instructure.com/courses/1408941>

Course Description

Introduction to embedded systems design and evaluation: requirements, specification, architecture, hardware and software components, integration and performance evaluation. Topics include microprocessors and microcontrollers, instruction sets, embedded computing platform, program design and analysis, operating systems, networks, and system analysis. Real-life embedded systems design examples will be used throughout the course to illustrate these concepts and to prepare students for a future career in embedded systems design.

Prerequisites

Undergraduate courses in programming, digital logic design, and computer organization.

Learning Outcomes

After successfully completing this course students will be able to:

- Define the concepts of embedded systems and identify applications to real-world systems.
- Utilize basic microprocessor and microcontroller functionality involving registers, memory, and hardware/software interfacing.
- Perform design analysis and implementation of embedded system solutions in hardware and software.
- Explore the features and functionality of an off-the-shelf microcontroller board.
- Program a microcontroller board to use timers, ADC, DAC, and serial communication modules to implement real-time applications.
- Describe and analyze project designs in a written report.

Course Materials

Required Resources

- Book: None
- Application/Software: An ARM processor-based development board and shields from the STM32 Nucleo family or STM32 Discovery family (Required; estimated cost: \$35).
- Total Estimated costs of required course materials: \$35.00

Supplemental Resources (no purchase required)

- Readings:
 - (1) Frank Vahid and Tony Givargis, Embedded System Design: A Unified Hardware / Software Introduction, ISBN: 978-0-471-38678-0.
 - (2) Marilyn Wolf, Computers as Components: Principles of Embedded Computing Systems Design, 5/e, Morgan Kaufmann, ISBN: 978-0323851282.
- Hardware/Software: None.

Course Structure

This course includes both on-campus and online sections. To attend the online lectures synchronously, log into ELMS-Canvas at the time of the Section 0101 class [Tue 4:00pm] and select "Video Conference" from the left side menu. This will open a Zoom link to the live classroom. All lectures will be recorded and made available on ELMS-Canvas under "Panopto Recordings/Video Lectures" within 24 hours of the lecture.

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

I can be reached by email at manoj@umd.edu. Please feel free to reach out about personal, academic, and intellectual concerns/questions. I will also be available after class.

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 CANVASLinks to an external site.](#)).

Log into our ELMS-Canvas course site at least once every 24-hour period to check your inbox and the Announcements page.

Grading

Grade Breakdown

Assignment	Percentage %
Homework Assignments	30%
Exam 1	25%
Project/Paper/Presentation	20%
Exam 2	25%
Total	100%

Course Assignments

Homework Assignments

- Design and implement a specific task in the development board used for this course
- The task will be geared for students to get hands on experience

Exam 1

- **Tue, 20 October.**

- Will cover approximately the first half of the course topics
- Will test knowledge and understanding of the topics

Exam 2

- **Tue, 1 December**
- Will cover approximately the second half of the course topics
- Will test knowledge and understanding of the topics

Project

- Propose, design, and implement a project in the development board used for this course
- Write a short description of the project, its design, the experimental results, and the conclusion
- **Tue, 8 December** Give a demo of the project to the instructor

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. It is my intention to grade all assignments within 2 weeks of their due date.

Grade Computation

All assessment scores will be posted on ELMS/Canvas. 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.

Grade Disputes: I am happy to discuss any of your grades with you and make corrections if needed. 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. Being close to a cutoff is not the same as making the cut (89.99 $\neq$ 90.00).

Final Grade Cutoffs

+ 94.00% + 84.00% + 74.00% + 64.00% +

A 90.00% B 80.00% C 70.00% D 60.00% F <57.0%

- 87.00% - 77.00% - 67.00% - 57.00% -

Lecture Schedule

Week #	Topic	Deliverable
1	Introduction to Embedded Systems	1 Sep, 2026
2	Microprocessors and Microcontrollers	8 Sep. 2026
3	ARM ISA and Microcontroller Board	15 Sep, 2026
4	Memory System	22 Sep, 2026
5	Peripherals, Sensors, and Actuators	29 Sep, 2026
6	Interfacing and Standard Protocols	6 Oct, 2026
7	State Machine and Concurrent Process Models	27 Oct, 2026
8	Embedded Operating Systems	3 Nov, 2026
9	Hardware-Software Codesign	10 Nov, 2026
10	Embedded Control Systems	17 Nov, 2026
11	Embedded Signal Processing Systems	24 Nov, 2026

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

For a complete list of graduate course related policies, visit the [Graduate School websiteLinks to an external site.](#) Below are course-specific policies and procedures which explain how these Graduate School policies will be implemented in this class.

Questions about Assignments

Please ask any detailed questions about an assignment during office hours or after lectures.

Late Work Policy

Assignments should be completed by the due date and time listed with the assignment, on ELMS. If you are unable to complete an assignment by the stated due date, it is your responsibility to contact me to discuss an extension, at least 24 hours BEFORE the assignment is due. Extensions are not guaranteed.

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.

Religious Observance

It is the student's responsibility to inform the instructor of any intended absences for religious observances no later than the end of the schedule adjustment period.

Academic Integrity

Please ensure that you fully understand the University's Code of Academic Integrity and its implications because all acts of academic dishonesty will be dealt with in accordance with the provisions of 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.**

If you use generative AI tools such as ChatGPT, Gemini, and Claude, you are required to declare material that you have obtained from them. As material obtained from generative AI tools are not necessarily accurate, exercise caution while using them; your assignments will be graded on their accuracy, irrespective of how you generated your assignment. The use of AI tools is strictly prohibited during the Exams.

Course assistance websites such as CourseHero are not permitted sources. Material taken or copied from these sites can be deemed unauthorized material and a violation of academic integrity. Additionally, students may choose to use online forums for course-wide discussions (e.g., Group lists or chats) to discuss course concepts. However, **collaboration on graded assignments is strictly prohibited unless otherwise stated**. Examples of prohibited collaboration include: asking classmates for answers on assignments and exams, etc. Please visit the [Office of Graduate Studies' full list of campus-wide policies](#)[Links to an external site.](#) and reach out if you have questions.

Exams are closed book, closed internet. **Your answers will be checked for use of AI tools; if suspected to have used AI tools, you will be referred to the Office of Student Conduct.** 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.

Homework Assignments	✓	✓	✓	---	---	---
Exam 1	---	---	---	---	---	---
Project	✓	✓	✓	✓	✓	---
Exam 2	---	---	---	---	---	---

Course Evaluation

Please submit a course evaluation through confidential Student Feedback on Course Experiences in order to help faculty and administrators improve teaching and learning at Maryland. 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](#)[Links to an external site.](#) 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.

Student Resources and Services

I encourage you to visit the [Counseling Center's Academic Resources](#)[Links to an external site.](#) to learn about the wide range of resources available to you. For additional resources and services

used by graduate students, please visit the Graduate School's [Campus Resources PageLinks to an external site.](#)

Accessibility and Disability Services

The [Accessibility & Disability Service \(ADS\)Links to an external site.](#) provides reasonable accommodations to qualified individuals to provide equal access to services, programs and activities. 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 [Accessibility and Disability Service websiteLinks to an external site.](#)

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.