



ENPM 613 Software Design and Implementation (101, SW01)

Course Description

Covers the software design process, from understanding the need or problem, to creating suitable architecture and detailed design solutions, to preserving and evolving the design during implementation and maintenance. The main study topics include: requirements analysis models; user centered design; architecture design through decomposition and composition; architecture styles and architecture tactics for supporting various quality attributes such as security and usability; design for reuse and with reuse; detailed design object-oriented principles (such as SOLID) and design patterns; approaches for evaluating, comparing, and selecting design solutions; standard notations for documenting architecture views, detailed design, and analysis models; and industry standards for creating design deliverables. Students will acquire not only technical knowledge, but also soft skills such as communication, collaborations, critical thinking, leadership, negotiation, and time management.

Learning Outcomes

This course is part of the core curriculum for the Software Engineering specialization of the Professional Master of Engineering Program and the Graduate Certificate in Engineering, and typically should follow ENPM611 and ENPM612. The ENPM613 course is also open to students in specializations other than Software Engineering, but they must have an appropriate background.

ENPM613 enables learning of industry best practices and their applications for designing and implementing software in a business setting, as well as development of soft skills needed by software engineers. After successfully completing this course, students will be able to:

- Define concepts of user centered design, software architecture and detailed design, and building-in software quality
- Apply engineering principles, methods, techniques, tools, and industry standard notations for developing and documenting software design
- Analyze and evaluate software design
- Implement and deliver software in accordance with its design, in a team environment
- Identify software design problems, propose adequate solutions, and analyze their benefits, cost, and limitations.

Course Materials

Required Resources

- **Textbook:** Introduction to Software Engineering Design: Processes, Principles and Patterns with UML 2 by Christopher Fox, Addison Wesley, First edition (2007). ISBN #0-321-41013-0 -
- **Application/Software:** Lucidchart - [TERPware Access](#)
- **Total Estimated costs of required course materials:** See Book Store or Amazon

Supplemental Resources (no purchase required)

- **Readings:** None
- **Hardware/Software:** None

Professor / Lecturer

Dr. Tony D. Barber

Pronouns: he/him/his

Email: TDBarber@UMD.edu

Phone: 202-321-0834

Location & Time

Days: Wednesdays

Hours: 7:00pm – 9:40pm

Building: JMP #3201

Teaching Assistant

Divyansh Shrivastava

Email: divyansh@umd.edu

Phone: 206-538-1974

Prerequisites

- ENPM 611 (or equivalent)
- Permission of ENGR – Maryland Applied Graduate Engineering (MAGE)
- Proficiency in software development and programming

Office Hours

- Tuesday 5:30PM – 6:30PM
- Format
 - By appointment only
- Please reserve at least 24 Hrs. prior.

Other Requirements

Course Communication

All course communication will be facilitated using the Canvas Messaging on the University of Maryland (UMD) Electronic Learning Management System (ELMS)

Course Materials

Orders for Course Materials have been sent to the Book Store. Most of the course material is provided free of charge by the school. Please review Canvas for more information.



Course Structure

We will use a flipped learning model.

- Before the class, students will:
 - Watch the pre-recorded lecture videos and study the slides and other assigned material
 - Submit questions regarding the material
 - Take quizzes, answer questions and do exercises for the topic of the week
- During class sessions we will:
 - Review the most important points in the material, and elaborate as needed
 - Address most frequently asked/most relevant questions
 - Perform hands-on activities, such as pair and group exercises, and discuss class work and homework
 - Have several project presentations throughout the semester
- Students will participate in ELMS (Canvas) Discussions
- Students will also learn through independent study and team work
- Assessment vehicles are quizzes, mid-term and final exam, and a team software design and implementation project
- Students will perform peer reviews of project deliverables
- For the group project, each student must fairly contribute to all activities and deliverables. At the end of each project phase, each student will provide a description of their contribution to the project, and feedback on their teammates' and their own performance. Individual project grades will be based on the grade for the group deliverables and on the individual contribution
- Mid-term and final exams will be closed book and closed notes.

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 Wednesdays 7:00pm – 9:40pm 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 onto 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 TDBarber@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 during the evenings after 6PM EST. Surprisingly, I am pretty responsive to Canvas Messages. But if its an emergency, you can send me a text.

When constructing an email to me please put "ENPM XXXX (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.



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

Grades are not given but earned. Your grade is determined by your performance on the learning assessments in the course and is assigned individually (not curved). If earning a particular grade is important to you, please speak with me at the beginning of the semester so that I can offer some helpful suggestions for achieving your goal.

All assessment scores will be posted on the course ELMS 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.

Late work will not be accepted for course credit so please plan to have it submitted well before the scheduled deadline. 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 via Canvas and within one week of receiving the grade.

Learning Assessments	#	Points Each	Category Total	Category Weight
Midterm Exam	1	100	100	25%
Final Exam	1	100	100	25%
Group Project (Total), distributed as follows:	7	Varies	1050	30%
• Project Plan and Management	1	50		
• Requirements Analysis	1	100		
• User Models and UI Prototype	1	200		
• Software Architecture	1	250		
• Detailed Design	1	250		
• Implementation	1	150		
• Software Project Final Presentations	1	50		
Learning Checks: Quizzes (Total)	10	Varies	Varies	10%
Learning Checks: Lecture Questions (Total)	10	5	50	10%



Total Points: 100%

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 this as making the cut (89.99 ≠ 90.00). It would be unethical to make exceptions for some and not others.

Final Grade Cutoffs									
+	97.00%	+	87.00%	+	77.00%	+	67.00%		
A	93.00%	B	83.00%	C	73.00%	D	63.00%	F	<60.0%
-	90.00%	-	80.00%	-	70.00%	-	60.00%		

Course Schedule			
Week	Date	Topic(s)	Mode
Week 1	8/30/2023	Introduction and Overview	In Person
Week 2	9/6/2023	Project Management 101	In Person
Week 3	9/13/2023	Requirements Analysis	In Person
Week 4	9/20/2023	Software Quality Attributes as Design Drivers	In Person
Week 5	9/27/2023	User Centered Design	In Person
Week 6	10/4/2023	Software Engineering Design	In Person
Week 7	10/11/2023	Software Architecture Development	In Person
Week 8	10/18/2023	Software Architecture Documentation	In Person
Week 9	10/25/2023	MIDTERM EXAM	Remote
Week 10	11/1/2023	Software Architecture Evaluation, Evolution, and Other Considerations	In Person
Week 11	11/8/2023	Software Detailed Design	In Person
Week 12	11/15/2023	Software Implementation, Testing, and Deployment	In Person
Week 13	11/22/2023	Thanksgiving Holiday	
Week 14	11/29/2023	Final Presentations Part I	Remote
Week 15	12/6/2023	Final Presentations Part II	Remote
Week 16	12/13/2023	FINAL EXAM	Remote

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.

Course Technology

- Personal Computers will be used to participate in class
- Please refrain from using your cellphone during 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.

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. Each assignment will contain more specific information regarding acceptable levels of collaboration.



	OPEN NOTES	USE BOOK	LEARN ONLINE	GATHER CONTENT With AI	ASK FRIENDS	WORK IN GROUPS
Learning Checks/Quizzes	✓	✓	✓	---	---	---
Team Project	✓	✓	✓	✓	✓	✓
Mid-term Exam	---	---	---	---	---	---
Final Exam	---	---	---	---	---	---

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

Course materials are copyrighted and may not be reproduced for anything other than personal use without written permission.

Other Course Policies

- For project presentations, all students must be present in class (on campus or virtually - for the online students)
- No make-up exams will be considered, except for very rare circumstances (officially excused absences). In that case, an equivalent (but not identical) exam will be administered. The make-up for the final exam must be administered before the last exam day of the semester.
- No work for extra credit will be considered.

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](http://ocrsm.umd.edu) 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.