

Syllabus	CMPSC 488: Computer Science Project	Spring 2016
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Instructor

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Office: Olmsted 255W(D), 717-948-6121

Office hours: MTWR 3:50PM–4:50PM (255W(D)), F 12:05AM–1:05PM (015C), or by appointment

Prerequisites

CMPSC 487W

Meetings

MW 2:30 PM–3:45 PM, Olmsted 264E

Textbook

- D. Rosenberg and M. Stephens, *Use Case Driven Object Modeling with UML: Theory and Practice*, Apress, 2007. (Available for download through PSU Library)
- S. Chacon and B. Straub (2014, November 9), *Pro Git* [Online]. Available: <http://git-scm.com/book/en/v2>
- Google (2015, November 1), *Style guides for Google-originated open-source projects* [Online]. Available: <https://github.com/google/styleguide>

Course Description

Project design and implementation with an emphasis on team work, documentation, and the employment and integration of computer science concepts.

Course Objectives

The main objective of this course is to obtain a hands-on experience in designing and developing a real-world software system. The course will emphasize collaboration and teamwork to employ and integrate computer science concepts. Students will work on a project that will serve as the capstone to the computer science degree program. Technical instruction, research, software implementation and delivered products will be required.

Course Outcomes

After taking this course, students should be able to

- Formulate, design, and solve software engineering problems, including the specification, design, implementation, and testing of software systems that meet the client requirements.
- Apply knowledge and skills to analyze and specify software design and architecture documents
- Apply design and development principles in the software processes of varying complexity
- Use current software engineering techniques, such as iterative software processes to develop a software system
- Use current tools such as UML design and version control in a practical setting
- Convey technical material through written/oral presentation and interaction with an audience
- Function effectively as a team member
- Understand professional, ethical, and social responsibilities of a software engineer
- Recognize the need for and be able to engage in continuing professional development

Grading Information

This course will have a series of deliverables designed to help guide student teams through the software development process. Instead of traditional lectures, most of the course meetings will be organized into working sessions where students work in teams on their projects and have weekly code review/progress meetings with the instructor. Your grade will be based on 8 deliverables. The contribution of each deliverable towards the final grade is described in

Project Information. The Course will use the following grading system, established by the University.

(95, 100]	: A	(85, 87]	: B	(70, 75]	: C
(90, 95]	: A-	(80, 85]	: B-	(60, 70]	: D
(87, 90]	: B+	(75, 80]	: C+	[0, 60]	: F

Additional Information

You can find more detailed and up-to-date version of the following information as well as other additional information at cs.hbg.psu.edu/additional-syllabus-info.

1. Email Contact

Announcements will be sent through email if needed. It is the responsibility of the student to regularly check his/her PSU email. If you need to contact the instructor regarding any questions or concerns related to the course via email, *you must have your subject line start with “COMP594” for immediate attention.*

2. Academic Dishonesty

The University defines academic integrity as the pursuit of scholarly activity in an open, honest and responsible manner. All students should act with personal integrity, respect other students' dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts (refer to Senate Policy 49-20¹ and Penn State Harrisburg Academic Integrity Policy²). Dishonesty of any kind will not be tolerated in this course. Dishonesty includes, but is not limited to, cheating, plagiarizing, fabricating information or citations, facilitating acts of academic dishonesty by others, having unauthorized possession of examinations, submitting work of another person or work previously used without informing the instructor, or tampering with the academic work of other students, tampering with program outputs, improper use of the internet and electronic devices, unauthorized collaboration, and alteration of graded assignments. Students who are found to be dishonest will receive academic sanctions and will be reported to the University's Office of Student Conduct for possible further disciplinary sanctions (refer to Senate Policy G-9³). *Ignorance of these rules is not an excuse.*

Academic honesty is required in all work you submit to be graded. Except where the instructor specifies group work, you must solve all homework and programming assignments without the help of others. For example, you must not look at anyone else's solutions (including program code) to your homework problems. However, you may discuss assignment specifications (not solutions) with others to be sure you understand what is required by the assignment.

If your instructor permits using fragments of source code from outside sources, such as your textbook or on-line resources, you must properly cite the source. Not citing it constitutes plagiarism. Similarly, your group projects must list everyone who participated.

Your instructor is free to override parts of this policy for particular assignments. To protect yourself: (1) Ask the instructor if you are not sure what is permissible. (2) Seek help from the instructor as you are always encouraged to do, rather than from other students. (3) Cite any questionable sources of help you may have received.

Report any violations you witness to the instructor.

3. Learning Center

The Russell E. Horn Sr. Learning Center website is harrisburg.psu.edu/learning-center. The Learning Center may have a peer tutor who can assist you in this course. Go to psuh.mywconline.com and choose the Specialty Tutor schedule to see what courses are supported. You can request an individual appointment or an appointment for a study group. If your course is not listed, email tutorrequest@psu.edu. The Learning Center will try to find a tutor and to match your schedule, though a tutor is not guaranteed. Drop in to the Learning Center offices, W-117 Olmsted or 106 EAB, or call 948-6475 for additional information.

Learning Center also provides Writing Support and Math Support. For more information about these services, visit cs.hbg.psu.edu/additional-syllabus-info.

4. Students with Disabilities

Penn State Harrisburg welcomes students with disabilities into the University's educational programs. If you have a disability-related need for modifications or reasonable accommodations in this course, contact the Office for Disability Services, located at 109 Swatara Building, (717) 948-6025. Your disability and need for accommodations have to be documented. If you qualify for accommodations, you will receive a letter that you will present to your professors outlining the specific accommodations, but not your specific disability. For further information, please visit harrisburg.psu.edu/disability-services.

¹<http://senate.psu.edu/policies-and-rules-for-undergraduate-students/47-00-48-00-and-49-00-grades/#49-20>

²<http://harrisburg.psu.edu/policy/academic-integrity-policy>

³<http://www.psu.edu/oue/aappm/G-9-academic-integrity.html>

The goal of this course is to provide you with an opportunity to put into practice the methodologies that you studied in previous computer science courses, especially **CMPSC 487W: Software Engineering**. In this course, you will work in teams of 3-4 people to develop a reasonably complex computer-based system. You are strongly encouraged to self-organize your team and select your project. However, your team and project must be approved by the instructor before any development activities begin. If you are having problems in organizing your team or selecting your project, contact the instructor immediately. Otherwise, you will be facing extreme difficulties in meeting many of the deliverable due dates.

Project Phases

Phase 0: Team Formation and Application Selection (Contribution: 0%)

- Due: January 13, 2016
- Reading: None
- Deliverables: Project proposal
- Description:

You are to self-organize your team and select your team project. Your team and project must be approved by the instructor before any development activities begin. Your one-page project proposal must include the title of the project, team name, the corresponding member, contact information of each member, and one paragraph description of your project.

Phase 1: Requirement Elicitation / Domain Model (Contribution: 10%)

- Due: January 20, 2016
- Reading: Chapters 1, 2, 3
- Deliverables: Functional Requirements, System Glossary, Domain Model
- Description:

One of the biggest challenges in software development is to obtain precise and unambiguous system and user requirements. Therefore, you must have an external client for whom you are developing the system. In the absence of an approved client, the instructor will play the role of the client from whom you must elicit system and user requirements. In this phase, you will formally document these requirements in a functional requirements document and a user requirements document. The functional requirements document should contain a table of functional requirements in the form of “System shall ...”, with priorities assigned to each requirement.

In addition, the document will contain a domain model. The domain model consists of a glossary of terms that are used in your project and a diagram that shows how these terms are related to each other. For example, Rosenberg and Stephens suggest that the domain model for an Internet Bookstore would define terms for the domain objects: Book, Customer, Order, and Order Item. The domain model diagram shows the “is-a” and “has-a” relationships between these objects. See the example diagram on p. 36 (and others) of the Rosenberg and Stephens book.

Phase 2: Preliminary Design (Contribution: 10%)

- Due: January 27, 2016
- Reading: Chapters 4, 5, 6, 7
- Deliverables: Use Cases, Use Case Diagrams, Optional: GUI Storyboard/Wireframes
- Description:

The deliverables will consist of description of use cases integrated with a GUI storyboard using wireframes. Use the following guidelines when developing your use cases:

- Use cases should fit into 2 paragraphs. If not, split the use case. See p. 73 in the Rosenberg and Stephens book for an example of a use case.
- Use cases should be written in the active voice and in a *noun-verb-noun* structure.

- Each of the functional requirements should be assigned to one or more use cases.
- Each use case should contain the basic course and alternate courses. Do not forget the alternate courses. The 90% of your system functionality will be the alternate courses and well over half of the complexity of a software project is usually caused by dealing with alternate courses of action. So, make sure you have accounted for all the alternate courses of action.
- Each use case should indicate which actor carries out the use case.
- Use cases must reference the domain and boundary objects by names defined in the glossary of your domain model. Remember that the domain model serves as a project glossary and it is critically important that the use cases are linked to the objects.
- The GUI storyboard with wireframes can be hand-drawn sketches.

Phase 3: Detailed Design (Contribution: 10%)

- Due: February 3, 2016
- Reading: Chapters 8, 9
- Deliverables: Sequence Diagrams, Static Class Diagram
- Description:

The deliverables will consist of sequence diagrams and a static class diagram. Each of the use cases should be translated into a sequence diagram. See p. 209 of the Rosenberg and Stephens book for an example. The sequence diagrams will be used to generate a static class diagram similar to the one on p. 215

Phase 4: Project Milestones (Contribution: 5%)

- Due: February 8, 2016
- Reading: None
- Deliverables: Software Process Schedule
- Description:

You will create a schedule for the project development, testing, and deployment, which includes detailed weekly milestones for your project. These milestones must include all components of the remaining deliverables. You should spend time making sure that your schedule is feasible and reasonable. Part of your grade will be based on how well you are able to keep up with this schedule and how well the schedule allows you to successfully complete the project.

Phase 5: Coding & Testing (Contribution: 30%)

- Dues: February 10, 17, 24, March 2, 16, 23, 30, April 6, 13, 20, 2016
- Reading: Chapters 10, 11, 12
- Deliverables: Working prototype of software, Unit tests
- Description:

The system design must drive the code development. If it does not, you should either make the code conform to the design or change the design.

As you develop your code, you must include unit, integration, and compatibility tests. Each class should be tested with unit tests, interoperability between classes should be tested with integration test, and interoperability with external components should be tested with compatibility tests.

Once these test are completed, system tests should be developed for each of the use cases. You should document these tests in a table, where each row includes an “Action” column and an “Expected results” column.

You should also consider how you will accomplish performance and/or stress testing of your system.

You will use Git Hub for version control. If you are not familiar with it, read *Pro Git* available at <http://git-scm.com/book/en/v2>.

Your code must conform to a Google Coding Style, unless you have made prior arrangements with the instructor. To access these coding styles, read *Style guides for Google-originated open-source projects* available at <https://github.com/google/styleguide>.

You should include appropriate comments for documentation of your system, using javadoc, Doxygen, Doc++, or an equivalent.

Phase 6: Promotional Website (Contribution: 10%)

- Due: April 27, 2016
- Reading: None
- Deliverables: Project website
- Description:

You will create a website to promote your system to users. The website will be hosted on a PSU server and made publicly available. Note that the target audience of your system is users, so you should design it appropriately. If you are designing an app, you must make it available in Google Play or the App Store.

The website should include the following:

- A main page that includes a video that gives an overview of your system demonstrating how great it is.
- A download/try-me page that allows users to try the web application or download the PC-based application, or that provides a link to the app in the GooglePlay/AppStore, etc.
- A support page that includes user documentation and/or videos explaining how to use the system.
- A system documentation page that provides the links to the functional/user requirements documents, preliminary design documents, detailed design documents, and test plan documents.
- An about page that includes a description of all of the team members, the links to the team members' home page/LinkedIn profiles, and the link to the GitHub repository for your project. You do not need to make the repository public, but you should include the link in any case.

For the video, you could consider using recordMyDesktop, Byzanz, pyvnc2swf, xvidcap, Istanbul, or Wink (for Linux), Open Broadcaster Software, CamStudio, Screencast-O-Matic, or Camtasia (for Windows), Voila, QuickCast, ScreenCast Maker, or Screenflow (for Mac), or a video camera pointed at a smart phone (which can also show the user interacting with the phone).

Phase 7: Complete System / Capstone Design Conference (Contribution: 25%)

- Due: February 24, 2016, Final period and May 6, 2016.
- Reading: None
- Deliverables: Complete System Demonstration, Presentation, Exhibition
- Description:

Tentatively, we have planned a launch party for the last class meeting (during final exam period). During the launch party, you will introduce your system, provide an overview of the website, and give a demonstration of your system. Your grade for this portion of the system will be based on the presentation, demo, and project website; how well you fulfilled the requirements specified in the requirements document; and your contribution to the group effort. Part of the grade will be based on a self-assessment.

You may also consider the launch party as a practice session for the Capstone Design Conference scheduled on May 6, 2016. Do not forget to submit the project description by February 24, 2016, so that your project can be included in the conference brochure. For more information about the conference, please refer to the attached description of the Capstone Design Conference.

Week	Deliverable	Due
1	Team formation / Project Selection	Jan. 13
2	Requirement Elicitation / Domain Model	Jan. 20
3	Preliminary Design	Jan. 27
4	Detailed Design	Feb. 3
5	Project Milestones	Feb. 8
	Coding & Testing	Feb. 10
6	Coding & Testing	Feb. 17
7	Coding & Testing	Feb. 24
	Project Description for Conference	
8	Coding & Testing	Mar. 2
9	Spring Break	
10	Coding & Testing	Mar. 16
11	Coding & Testing	Mar. 23
12	Coding & Testing	Mar. 30
13	Coding & Testing	Apr. 6
14	Coding & Testing	Apr. 13
15	Coding & Testing	Apr. 20
16	Promotional Website	Apr. 27
17	Complete System	Final period
	Capstone Design Conference	May 6

This schedule is tentative. The instructor reserves the right to adjust it as the class advances. However, We will adhere to it as closely as possible.

Capstone Design Conference

May 6, 2016

Tentative Schedule

7:30 AM	Breakfast (CUB Gymnasium)
9:00 AM	Presentation (E244 Olmsted Building)
12:00 PM	Lunch (CUB Gymnasium)
1:30 PM	Exhibition/Demonstration (EAB and Engineering Lab)
3:30 PM	Ring Ceremony (EAB 102)
4:00 PM	Awards Ceremony (EAB 102)

Important Information

- All student teams are required to do a presentation. Total time including the setup, presentation, and Q/A is 30 minutes.
- In addition to presentation, all student teams are required to prepare an exhibit (tri-fold) or demonstration. Tri-folds will be provided to all teams per request, as soon as possible.
- Judging criterion for exhibition and demonstration will be provided to all teams at a later date. All team members should be present next to their exhibit or demonstration to answer judge's questions. All students and advisers should be present during the awards ceremony.
- Last date to turn in the project details (title, student names, adviser(s), and brief description) to be included in the brochure is February 26, 2016.

Department Expectations

- Your administrative staff assistant is

Jeanne Bennardo
Office: W255 Olmsted
Phone: 717-948-6081
Email: jmb84@psu.edu

Please contact Jeanne with any questions.

- Provide the staff assistant with the contact information for each member of your team. You must designate one person as the corresponding member to handle all correspondence and follow ups.
- If you need to make any purchases for your project, see the instructor on how to proceed.