

CMPSC 580
Topics and Research Methods in Computer Science
Spring 2015

Syllabus

Course Instructor

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Instructor's Office Hours

- Monday: 1:00 pm – 2:00 pm (15 minute time slots)
- Tuesday: 2:00 pm – 4:00 pm (15 minute time slots)
- Wednesday: 3:00 pm – 5:00 pm (15 minute time slots)
- Thursday: 10:00 am – 11:00 am (15 minute time slots)
- Friday: 1:30 – 2:30 pm (15 minute time slots)

To schedule a meeting with me during my office hours, please visit my Web site and click the “Schedule” link in the top right-hand corner. Now, you can browse my office hours or schedule an appointment by clicking the correct link and then reserving an open time slot.

Course Meeting Schedule

Lecture, Discussion, and Presentations: Tuesday and Thursday 11:00 am–12:15 pm;
Laboratory Session: Friday 2:30 pm –4:20 pm

Course Catalogue Description

An advanced treatment of selected topics from various areas of computer science with an emphasis on appropriate research methods. Practical skills are acquired in technical writing, critical reading, and presentation of technical literature in preparation for the senior project. One laboratory per week. Prerequisite: Completion of the computer science core or permission of the instructor.

Required Textbooks

On Being a Scientist: A Guide to Responsible Conduct in Research (Third Edition). Committee on Science, Engineering, and Public Policy, National Academy of Sciences, National Academy of Engineering, and Institute of Medicine. ISBN: 0309119715, 82 pages, 2009. (References to the textbook are abbreviated as “OBAS”).

BUGS in Writing: A Guide to Debugging Your Prose (Second Edition). Lyn Dupré. Addison-Wesley Professional. ISBN-10: 020137921X and ISBN-13: 978-0201379211, 704 pages, 1998. (References to the textbook are abbreviated as “BIW”).

Writing for Computer Science (Second Edition). Justin Zobel. Springer ISBN-10: 1852338024 and ISBN-13: 978-1852338022, 270 pages, 2004. (References to the textbook are abbreviated as “WFCS”).

Along with reading the required books, you will be asked to study many additional papers from a wide variety of both conference proceedings and journals.

Class Policies

Grading

The grade that a student receives in this class will be based on the following categories. All percentages are approximate and, if the need to do so presents itself, it is possible for the assigned percentages to change during the academic semester.

Class Participation	10%
Research Notebook and Meeting Record	10%
Writing and Practical Skill Assignments	15%
Research Presentations	15%
Module Proposals	30%
Final Project	20%

Each of the above grading categories has the following definition:

- *Class Participation:* All students are required to actively participate during all of the class sessions. Your participation will take forms such as answering questions about the required reading assignments, asking the presenting student(s) a constructive question, serving as a session chair for a group of presentations, and leading a brainstorming session. Whenever appropriate, you will receive a class participation grade for each module of the course.
- *Research Notebook and Meeting Records:* All students must keep a research notebook throughout the semester. Your notebook will contain your observations about all of the reading assignments and details about your own research interests. Each of the dated and signed notebook entries should include paragraphs, diagrams, lists of important points and relevant questions, links to Web sites, description of software installation procedures, and other information about research in computer science. Your research notebook will be collected and graded at the end of each module. For every course module, students are asked to attend a fifteen minute meeting with the instructor who coordinates that module. After your meeting with this individual, you must record the date, time, meeting subject, and receive the signature of the professor. Your meeting record will be collected at the end of the semester and a lack of signatures will lead to a reduction of your score for this part of your grade.

- *Writing and Practical Skill Assignments:* For each of the assigned research articles, a student will be responsible for completing a paper review containing short paragraphs that summarize and evaluate the paper and then propose interesting questions, insights, and areas for future work suggested by the reading. For each of the reading assignments from WFCS, OBAS, and BIW, you must write a precis, or a “concise summary of essential points, statements, or facts” about the assignment (Merriam-Webster Online Dictionary). During each module of the course, students also must complete a wide variety of practical skill assignments (e.g., writing technical papers in L^AT_EX, using the ACM Digital Library and B_IB_TE_X, creating technical diagrams with Graphviz and PGF/TikZ, formatting algorithms and equations in L^AT_EX, and installing open source software). Evidence that a student has mastered the practical skills taught during the module must be evident in the module proposal that the student submits.
- *Research Presentations:* During each module of the course, a team of students will give a fifty to sixty minute presentation explaining the assigned article(s) and suggesting areas for future research. On the last day of the second and fourth weeks of a module, every student will give a lightning talk — a short three to five minute presentation, leveraging no more than two slides, that effectively describes the topic. With a topic that is (roughly) distinct from the theme of the module, the first lightning talk must explore a new idea for your senior thesis. The second lightning talk must suggest an idea connected to the current module’s theme.
- *Module Proposals and Presentations:* Using L^AT_EX, B_IB_TE_X, Vim, and other relevant technical writing tools, a student is responsible for creating a five page proposal and a five minute presentation that both connect to the theme of each module. The proposal should contain an interesting and informative title, a one paragraph abstract, and several sections of text that describe your proposed research. The presentation should have the same title as your proposal and contain enough slides for a short, yet intuitive and compelling, introduction to your idea. Students are encouraged to meet with the course instructor and the module professor about their proposed research. The proposal and the presentation slides must contain evidence that the student can use all of the practical skills that were taught during the module. The proposal and the presentation slides are due on the fourth Friday of the module.
- *Final Project:* Each student must complete a final project that consists of a ten page research proposal, a poster suitable for presentation during a department-wide poster session, and a fifteen to twenty minute presentation describing your proposed research to the class. While the course instructor will give you a grade for your poster and your participation in the poster session, all students and faculty in the Department of Computer Science will be invited to provide you with written feedback about your proposed work and the poster itself.

Assignment Submission

All assignments will have a stated due date. The printed and electronic version of the assignment is to be turned in at the beginning of the class on that due date; the printed materials must be dated and signed with the Honor Code pledge of the student(s) completing the work. Late assignments will be accepted for up to one week past the assigned due date with a 15% penalty. All late work must be submitted at the beginning of the session that is scheduled one week after the due date. Unless special arrangements are made with the course instructor, no assignments will be accepted after the late deadline. For any assignment completed in a group, students must also turn in a one-page document that describes each group member’s contribution to the submitted deliverables.

Class Attendance

It is mandatory for all students to attend all of the class and laboratory sessions. If you will not be able to attend a session, then please see the course instructor at least one week in advance to describe your situation. Students who miss more than two unexcused classes or group project meetings will have their final grade in the course reduced by one letter grade. Students who miss more than four of the aforementioned events will automatically fail the course.

Laboratory Attendance

In order to acquire the proper skills in technical writing, critical reading, and the presentation and evaluation of technical material, it is essential for students to have hands-on experience in a laboratory. Therefore, it is mandatory for all students to attend the laboratory sessions. If you will not be able to attend a laboratory, then please see the one of the course instructor at least one week in advance in order to explain your situation. Students who miss more than two unexcused laboratories will have their final grade in the course reduced by one letter grade. Students who miss more than four unexcused laboratories will automatically fail the course.

Use of Laboratory Facilities

Throughout the semester, we will investigate many different software tools that computer scientists use to perform, write about, and present research in the field. The course instructor and the department's systems administrator have invested a considerable amount of time to ensure that our laboratories support the completion of both the laboratory assignments and the final project. To this end, students are required to complete all assignments and the final project while using the department's laboratory facilities. The course instructor and the systems administrator normally do not assist students in configuring their personal computers.

Email

Using your Allegheny College email address, the course instructor will sometimes send out announcements about matters such as assignment clarifications or schedule changes. You must check your email at least once a day and ensure that you can reliably send and receive emails. This class policy is based on the following statement in *The Compass*, the College's student handbook.

“The use of email is a primary method of communication on campus. . . . All students are provided with a campus email account and address while enrolled at Allegheny and are expected to check the account on a regular basis.”

Disability Services

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. Students with disabilities who believe they may

need accommodations in this class are encouraged to contact Disability Services at 332-2898. Disability Services is part of the Learning Commons and is located in Pelletier Library. Please do this as soon as possible to ensure that approved accommodations are implemented in a timely fashion.

Honor Code

The Academic Honor Program that governs the entire academic program at Allegheny College is described in the Allegheny Course Catalogue. The Honor Program applies to all work that is submitted for academic credit or to meet non-credit requirements for graduation at Allegheny College. This includes all work assigned for this class (e.g., examinations, laboratory assignments, and the final project). All students who have enrolled in the College will work under the Honor Program. Each student who has matriculated at the College has acknowledged the following pledge:

I hereby recognize and pledge to fulfill my responsibilities, as defined in the Honor Code, and to maintain the integrity of both myself and the College community as a whole.

It is recognized that an important part of the learning process in any course, and particularly one in computer science, derives from thoughtful discussions with teachers and fellow students. Such dialogue is encouraged. However, it is necessary to distinguish carefully between the student who discusses the principles underlying a problem with others and the student who produces assignments that are identical to, or merely variations on, someone else's work. While it is acceptable for students in this class to discuss their programs, technical diagrams, proposals, paper reviews, presentations, and other items with their classmates or other individuals, deliverables that are nearly identical to the work of others will be taken as evidence of violating the Honor Code.

Module Schedule

Overview

This class is divided into four modules: a two-week introduction to research in computer science and three four-week modules focusing on the introduction of both distinct areas of computer science and the practical and conceptual skills needed to conduct research in the field. This schedule is preliminary and, if the need to do so presents itself, it is possible for it to change during the semester.

In summary, this course will adhere to the following schedule during the Spring 2015 semester.

- **Module One:** Introduction to Research in Computer Science
 - Week One: January 12 – January 16, 2015
 - Week Two: January 19 – January 23, 2015

- **Module Two:** Software Testing and Debugging
 - Week One: January 26 – January 30, 2015
 - Week Two: February 2 – February 6, 2015
 - Week Three: February 9 – February 13, 2015
 - Week Four: February 16 – February 20, 2015

- **Module Three:** Cooperation in Multi-Robot Systems
 - Week One: February 23 – February 27, 2015
 - Week Two: March 2 – March 6, 2015
 - Week Three: March 9 – March 13, 2015
 - Week Four: March 23 – March 27, 2015
- **Module Four:** Graphics and Information Visualization
 - Week One: March 30 – April 3, 2015
 - Week Two: April 6 – April 10, 2015
 - Week Three: April 13 – April 17, 2015
 - Week Four: April 20 – April 24, 2015
- **Last Day of Classes:** April 28, 2015
- **No Classes:** March 16 – March 20 and March 31, 2015

Details

Each of the four-week modules will adhere to a schedule in which students meet on Tuesday, Thursday, and Friday to participate in the following types of activities: group discussions, individual and team-based presentations, brainstorming sessions, practical and conceptual skills exercises, and the creation and editing of both a module proposal and a presentations. The following module schedule is preliminary and, if the need to do so presents itself, it is possible for it to change.

Week	Tuesday	Thursday	Friday
W1	Topic: Professor presentation Due: None	Topic: Paper review discussion Due: Paper review	Topic: Conceptual skills (WFCS) Due: WFCS precis
W2	Topic: Team presentation Due: Presentation slides	Topic: Brainstorming session Due: Five new ideas	Topic: Lighting talks (module) Due: Presentation slides
W3	Topic: Practical skills Due: Proposal outline	Topic: Write & edit proposal Due: Proposal draft	Topic: Conceptual skills (BIW & OBAS) Due: BIW and OBAS precis
W4	Topic: Practical skills Due: Presentation outline	Topic: Write & edit presentation Due: Presentation draft	Topic: Lightning talks (student) Due: Proposal and slides

Welcome to an Adventure in Computer Science Research

Computer hardware and software are everywhere! Conducting research in computer science is a challenging and rewarding activity that leads to the production of hardware, software, and scientific insights that have the potential to positively influence the lives of many people. As you learn more about research methods in computer science you will also enhance your ability to effectively write and speak about a wide range of topics. At the start of this class, the course instructor invite you to pursue this adventure in computer science research with both enthusiasm and vigor.