This syllabus describes the course Advanced Software Engineering. As you will notice, the course content is quite different than what is advertised in the course catalog. Since the research agenda of the software engineering group has changed dramatically over the last four years, so has the content of the Advanced Software Engineering courses. This change will be reflected in future course catalogs.

This syllabus explains the organization of the course, outlines the expectations for the course, and provides the rules that will govern grading and class participation.

**Course Description**
Software engineering is concerned with the cost effective development and evolution of software systems. In this course we will explore techniques that can be considered “advanced” software engineering techniques.

The purpose with this course is to provide the student with a foundation in formal modeling and formal analysis. The students will be introduced to the basic ideas behind formal modeling, exposed to the main approaches to formal modeling and analysis, and get a chance to try some methods on smaller examples. Furthermore, the students are expected to learn how to critically read and evaluate research papers, and how to prepare a research proposal.

**Course Goals**
- Understand the importance of modeling in software engineering
- Learn about different modeling and analysis approaches.
- Try several approaches on small examples and gain experience with some existing tools.
- Learn how to critically read and evaluate research papers.
- Learn how to write an effective research proposals.

**Requirements**
Undergraduate software engineering (or equivalent experience). Some knowledge of sets, finite state machines, propositional logic, predicate logic, and at least two different programming languages.
On Line Resources
The course web page is located at the following URL:

http://www-users.cs.umn.edu/~heimdahl/csci8801/

Also accessible from

http://www.cs.umn.edu/~heimdahl/

Course Administration and Personnel
Professor
Mats P.E. Heimdahl, 5-191 EE/CS
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Teaching Assistant(s)
None

Texts
Required Readings

Additional readings will be assigned as the course progresses. Most will be available to download from the course web page.

Optional Readings
Everything about formal modeling you can find in the library and on the web.

Tests
There will be no midterm and final in the course.

Assignments
The assignments in the course are as follows:

1. Several short modeling exercises using various tools and techniques.
2. A short (2-3 page) evaluation of each major modeling approach covered in class. The exact number of short papers will be determined later, but I expect you will have to turn in approximately four reports.
3. In class presentations. You will be required to present your models and your evaluations in class at regular intervals.
4. A term project. The term project in this class will be a research proposal. This proposal must outline the importance of the proposed research, contain a critical evaluation of related work, define the proposed research project, and provide a research plan. The details of how to write such a proposal will be presented in class. There is a strict page limit of 20 pages on the proposal. However, you cannot substitute quality with quantity.
5. An annotated bibliography of all papers read in preparation of the research proposal. The bibliography must be prepared using BiBTeX and must contain an evaluation of the paper, some keywords, and the name of the creator of the entry.

6. Class participation. The class is a research seminar class so discussion and class participation are important. You are expected to participate in discussions, present models and papers in class, and lead the discussion of the models and papers you present.

Expected work load
The modeling may take quite a bit of your spare time. We do not have a large project, but the modeling assignments can be quite time consuming.

Group work
Projects in science and industry are invariably done in groups. Thus, you may work on your assignments collaboratively in a team of no larger than 3 persons. Naturally, you can discuss your work with other students to better understand the problems—discussions are always good. Nevertheless, you have to turn in your assignments with your group members and I expect you all to adhere to the university guidelines on plagiarism and cheating. Be aware that you need to pull your weight on the assignments. Substandard work is obvious to your groups as well as the instructor and will be reflected in your grade. In addition, each group is required to turn in peer evaluations at the end of the course.

In exceptional cases the term paper/project can be conducted in groups. If you feel a group project will be beneficial, you are encouraged to discuss the project with the instructor.

Grading
About 40% of your grade will be based on the group assignments. You are graded on the quality of the work you produce, not on how many hours a week you spend.

40% of your grade will be based on your research proposal/term project and the remaining 20% based on class participation.

Students are required to perform satisfactory on both assignments and term project to receive a passing grade. All assignments and projects will be awarded 100 points. A general guideline for grading will be the following:

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<th>Total Score (s)</th>
<th>Letter Grade</th>
<th>S/N Grade</th>
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<tr>
<td>100≤s&lt;95</td>
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<td>95≤s&lt;90</td>
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<td>90≤s&lt;87</td>
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<td>78≤s&lt;75</td>
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Additional Course Information
This section contains some general rules that will be enforced during the course. Please review these guidelines carefully.

Integrity and Ethics
The policy of the university on scholarship and grades will be followed. Implicit in handing in homework, assignments, papers, and exams is that they represent the student’s own work (or the result of sanctioned collaboration). Any exceptions should be explicitly noted. Representing someone else’s work as one’s own is grounds for failing the course.

Classroom Climate
All students are expected to behave as scholars at a leading institute of technology. This includes arriving on time, not talking during lecture (unless addressing the instructor), and not leaving the classroom before the end of the lecture. Disruptive students will be warned and potentially dismissed from the classroom.

Examinations
The midterm (held during regular lecture hours) and a final are required. These exams will contain questions covering material in the required text, homework, assignments, and lectures. If any of the tests fall on a religious holiday the tests will be rescheduled.

Make-up
Make-ups for graded activities may be arranged if your absence is caused by documented illness or personal emergency. A written explanation (including supporting documentation) must be submitted to your instructor; if the explanation is acceptable, an alternative will be arranged. Whenever possible, make-up arrangements will be completed prior to the scheduled activity. A student not taking an exam or not turning in an assignment will receive a score of 0. Alternative times for the final exam will be arranged only under university criteria for rescheduling a final exam.

Late submissions
Programming assignments and homework are due at the beginning of class. Late work is not accepted without prior approval. Any assignment turned in after class will be considered late and will be subject to the usual penalties. Submitting all assignments is a necessary condition for passing this class. Assignment submitted late will be penalized 10% per day, including weekends and holidays.

Incomplete
The I grade indicates that the instructor has (1) reasonable expectations that the student can complete an unfinished course on her/his own no later than the end of the next quarter and (2) believes that legitimate reasons exist to justify extending the deadline for course completion. The only acceptable reasons will be documented illness or personal emergency. A written explanation (including supporting documentation) must be submitted to your instructor; if the explanation is acceptable, an Agreement for the Completion of Incomplete Work will be filled out as a contract between the student and the instructor.

Special needs
It is University policy to provide, on a flexible and individual basis, reasonable accommodations to students that have disabilities that may affect their ability to participate in course activities or to meet course requirements. Students with disabilities are encouraged to contact their instructor early in the quarter to discuss their individual needs for accommodations.