Informatics 213: Requirements Engineering and Specification
Professor Debra Richardson
Fall 2012; Course Code: 37193; Tuesdays and Thursdays, 2-3:20, DBH 1427

Catalog Description (modification approved by Informatics faculty)
Study of rigorous techniques in requirements engineering – requirements definition phase of software development – with focus on modeling and specification. Topics include: notations and models for requirements specification; and methods, tools and processes for software requirements elicitation, representation, analysis and validation.

Overall Goals
This course exposes students to the problem of determining and specifying what a proposed software system should do – that is, the problem to be solved by software. There are some nontechnical aspects of the course, with respect to communication and negotiation with multiple stakeholders. However, most of the course covers technical approaches to the requirements problem, such as notations and models for documenting and specifying requirements, strategies for prioritizing requirements, and techniques for eliciting and analyzing documented requirements.

Course Objectives
1. Examine the state-of-the-art for research & practice in requirements engineering: a. Role of RE in software and systems engineering; b. Current notations and models used for requirements specification; c. Current methods, tools and processes used in RE for eliciting, analyzing and validating requirements.
2. Gain practical experience in selected RE techniques.
3. Understand the essential nature of RE: a. Breadth of skills needed for RE and the many disciplines on which it draws; b. Contextual factors and practicalities that affect the success of various approaches to RE.
4. Gain a basic grounding for research in RE: a. Methodological issues for RE research; b. Current research issues and the direction of the field; c. Awareness of the literature.

Class Structure
The class will be essentially interactive. Each class will consist of a mixture of lecture material, discussions about the weekly readings, and student presentations. Discussion will be seeded by questions and observations, based on the readings, from all students.
The schedule may change from time to time to accommodate conferences, etc. Please watch the course website for announcements.

Students with Disabilities
Any student who feels he or she may need an accommodation based on the impact of a disability should contact me privately to discuss his or her specific needs. Also contact the Disability Services Center at (949) 824-7494 as soon as possible to better ensure that such accommodations are implemented in a timely fashion.
Readings
There is no textbook for this course (although there have been many good books published on
requirements engineering, no single book covers the field adequately). Instead, the lecture material is
structured around a collection of research papers as the core readings for the course, thus providing
a better overview of research.
Each week there will be one or more papers to read. All materials are available online.
You are expected to read the required readings before class and come prepared to discuss what you
have read. These discussions form a core part of the course, so it is important that everyone comes
prepared. Each week, one or two students will be assigned to lead the discussion.

Copyright
The readings are provided to ensure timely dissemination of scholarly and technical work on a non-
commercial basis and are for the sole use of students enrolled in Informatics 213. Copyright and all
rights therein are maintained by the authors or by other copyright holders, notwithstanding that
they have offered their works here electronically. It is understood that all persons copying this
information will adhere to the terms and constraints invoked by each author’s copyright. These
works may not be reposted without the explicit permission of the copyright holder.

Student Assessment

Class Participation: 10%
Each student is expected to have read the required reading before class and must submit questions
and observations as discussion points about the reading(s) by the day prior to class. The discussion
points could be any thoughts about the paper, such as anything controversial in the paper, comments
about research methodology, questions about things that are unclear in the paper, ideas for follow up
research, strengths and weaknesses of the paper, etc. It is best to choose open-ended
questions/issues that will provoke class discussion.

All students will be evaluated on their submitted discussion points as well as their participation in
the class discussion.

Class Discussion Lead: 10%
During the quarter, each student will lead the discussion on one week’s readings. This should consist
of a short oral and/or slide-based summary presentation (20-30 minutes) of the required paper
reading and one or more of the other relevant readings listed, as well as leading the discussion of the
topic and papers based on the discussion points submitted by all students (see above).

Practical Project: 30% – Case Study
Each student will perform a case study by adopting one software system and illustrate two (or more)
different requirements engineering techniques with concrete examples. You can choose any
methods or tools, whether covered in the course or not (although if not covered, please check with
me for relevance first) but the two chosen should be from different orientations. For instance, you
could choose a case study described in the literature and reconstruct the software system in both an
informal notation and a more formal specification language. Or, you might choose to experiment with
some requirements elicitation techniques and obtain requirements from real stakeholders and then
express these requirements in some notation of your choice.
The case study should consist of a practical application of two different methods in requirements
engineering. Please discuss the project with me to ensure that it is of adequate complexity and
appropriate for the method you have chosen. If the method has an associated tool available, try to
get the tool to install and try out. If you wish to use a commercial tool, we may be able to get an
evaluation copy or an academic license.
Based on your case study, a few slides should be prepared that illustrate the case study and any
interesting findings in the example system.
**Research Project: 40%**

Each student will also conduct a research-based project, with the following two options:

**Option 1: Innovation and Poster+Paper**

You may come up with a new “invention” or innovation in requirements engineering. This could be a new technique, a new modeling notation, a novel approach for a particular domain, a new tool, a novel integration of existing techniques, or any other new "thing" created as a result of your readings and experience in the class. Be sure that what you propose is not something that has already been proposed by someone else in the literature. Your innovation should be explained to your classmates via a poster (presented during the final exam period), and also described in a short paper (no more than ten pages). The innovation does not have to be fully demonstrated or evaluated, but the concept and novelty should be clear from the poster and presentation.

**Option 2: Literature Survey and Poster+Paper**

If you do not feel you can come up with an innovation in requirements engineering, you can choose to write a survey of research in some particular area of requirements engineering. Please discuss your choice of topic with me before you start work on your survey. There are several ways to tackle this assignment. For example, you could choose two or three papers describing different research projects that have tackled a similar problem, and write a detailed comparison of them. Or you could choose a larger set of papers that cover a topic, and write an overview, discussing both what has been achieved, comparing and contrasting approaches, and what are the remaining problems. Other approaches are possible. Your literature survey should be a paper of no more than ten(-15) pages. In addition, the highlights of your survey should be presented to the class via a poster (during the final exam period).

**Poster Presentation: 10%**

During the final exam period, you will give a ten-minute presentation describing the work of your research project. If you would prefer to present your case study, this is a possibility but please discuss this with me.

**NOTE:**

The two primary assignments can be tackled in any order. You may link your work on these class assignments to your graduate research work, as long as it is relevant to this course, but not to other course work.

All papers are expected to conform to the IEEE conference paper submission format.

**Deadlines:**

- First assignment due: Monday, November 19
- Second assignment due: Monday, December 10
- Final / Poster presentations: Thursday, December 13, 1:30-3:30pm

Class discussion leads will be scheduled as the course proceeds.
# Fall 2012 Schedule
(subject to change)

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<thead>
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<th>Week</th>
<th>Date</th>
<th>Lecture Topic</th>
<th>Discussion of Readings</th>
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<td>9/27</td>
<td>Course Orientation &amp; Introduction to Requirements Engineering</td>
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<tr>
<td>2</td>
<td>10/9</td>
<td>Basics and Context of Requirements Engineering</td>
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<td>3</td>
<td>10/16</td>
<td>Project Initiation</td>
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<td>4</td>
<td>10/23</td>
<td>Elicitation Techniques</td>
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<td>5</td>
<td>10/30</td>
<td>Introduction to Modeling &amp; Modeling Enterprises</td>
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<tr>
<td>6</td>
<td>11/6</td>
<td>Modeling Information and Behavior</td>
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<td>7</td>
<td>11/13</td>
<td>Modeling Quality and Non-Functional Requirements</td>
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<td>8</td>
<td>11/20</td>
<td>Specifications &amp; Validation</td>
<td>11/22 Thanksgiving</td>
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<tr>
<td>9</td>
<td>11/27</td>
<td>Managing Change and Inconsistency</td>
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<td>10</td>
<td>12/4</td>
<td>How Much Formality?</td>
<td>12/6</td>
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<tr>
<td>Final</td>
<td>12/13</td>
<td>Poster Presentations</td>
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**NOTES:** No class will be held the week of October 1. Class schedule will be adjusted to account for Thanksgiving.
Outline and Readings

Week 1: Course Orientation & Introduction to Requirements Engineering

- **Required Background Reading** (required before second lecture):

Week/Topic 2: Basics and Context of Requirements Engineering

- **Required Reading**:

- **Other Relevant Readings**:

Week/Topic 3: Project Initiation

- **Required Reading**:

- **Other Relevant Readings**:

Week/Topic 4: Requirements Elicitation and Creativity Techniques

- **Required Reading**:

- **Other Relevant Readings:**

**Week/Topic 5: Introduction to Modeling & Modeling Enterprises**

- **Required Reading:**

- **Other Relevant Readings:**

**Week/Topic 6: Modeling Information and Behavior**

- **Required Reading:**

- **Other Relevant Readings:**

**Week/Topic 7: Modeling Quality and Non-Functional Requirements**

- **Required Reading:**

- **Other Relevant Readings:**

**Week/Topic 8: Specifications & Validation**

- **Required Reading:**

- **Other Relevant Readings:**

**Week/Topic 9: Managing Change and Inconsistency**

- **Required Reading:**

- **Other Relevant Readings:**


**Week/Topic 10: How Much Formality?**

- **Required Reading:**

- **Other Relevant Readings:**
Other References

Books on Requirements Engineering (just in case you want to look further):


Books on UML:

- Larman's Applying UML and Patterns
- Rumbaugh et al.'s UML Reference Manual

Online Resources (including UML)

- Requirements book reviews by Ian Alexander: http://easyweb.easynet.co.uk/~iany/reviews/reviews.htm
- UML Superstructure Specification, v2.2 from OMG
- IBM references for UML from Rational
- UML reference from Allen I Holub & Associates
- Mike Godfrey's list of UML tools