Course Overview

Large scale software development requires the ability to manage resources—both human and computational—through control of the development process. This course addresses the breadth of managing software development and is designed to help technically trained software engineers to acquire the knowledge and skills necessary to lead a project team, understand the relationship of software development to overall project engineering, estimate time and costs, and understand the software process. The nature of software development is sufficiently unique to require specialized management techniques, especially in the areas of estimating and scheduling.

Course Objectives

Successful completion of this course will provide you with the knowledge and skills to
- Lead a project team.
- Understand the relationship of software development to overall project engineering.
- Estimate time and costs.
- Understand the software process.

Prerequisite

- Industrial software engineering experience with a large project, or a comprehensive undergraduate course in software engineering.

Organization

The course consists of a series of lectures conducted by faculty and staff from the School of Computer Science at Carnegie Mellon University. The lectures, captured on DVDs, lead the way through a series of assignments and chatroom discussions.

Your best approach to successfully complete the course is to follow three simple steps.
1. Do the assigned readings.
2. Watch the lecture.
3. Complete the assignments.

All course materials, with the exception of the texts and DVDs, will be available on the Carnegie Mellon Blackboard System. Email with specific information about the course Blackboard site will be sent to you prior to the start of class.

Feedback and Support

Office hours and computer conferences will take place in the Virtual Classroom on the course Blackboard site. Your instructor for the course will conduct course discussions in the Virtual Classroom every week, specific time to be determined. Should your instructor decide to use another chat tool, they will notify
you at the beginning of the course. Other times, your instructor will be available by email. In addition, you should feel free to post questions and comments on the course electronic bulletin board at anytime to discuss the readings, the course, and issues related to software engineering with members of your class.

Readings

Weekly readings are used to stimulate discussion and as a way to expose you to course topics not covered directly in the lectures. For most lectures, you will be assigned a few readings to complete before watching the lecture.

The required textbooks for the course are *Software Engineering: A Practitioner’s Approach*, by Roger S. Pressman; and *Essentials of Software Engineering*, by Frank Tsui and Orland Karam. You will also be required to the following case studies and readings from Harvard Business Online: *Microsoft Corporation: Office Business Unit* by Marco Iansiti and Geoffrey K. Gill; *Cimetrics Technology (A1)* by Lynn Sharp Paine and Jose Royo; *Leadership That Gets Results* by Daniel Goleman; and *The Satera Team at Imatron Systems, Inc. (A)* by Teresa M. Amabile and Elizabeth A. Schatzel.

Evaluation

No programming will be required in this course. The course grade will be determined by four factors.

*Reading Questions*: Your answers to the reading questions will help the instructor to determine if you understand the material presented in the lectures and readings. The grading for individual sets of reading questions will be pass/fail.

*Case Studies/Assignments*: Homework exercises will be used to ensure that you understand certain tools and/or concepts. The overriding purpose of these assignments is for you to improve your written and oral communication skills.

*Final Project Paper*: Through use of material presented in class and your own research, you will demonstrate your ability to apply tailored practices to meet software development needs.

*Instructor judgement*: The instructor reserves the right to raise or lower your quantitatively determined grade based on their judgement of your mastery of course material; this judgement will be based in part on your ability to participate constructively in class discussions.

Schedule

<table>
<thead>
<tr>
<th>#</th>
<th>Lecture Title</th>
<th>Readings</th>
<th>Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>General Project Management &amp; Course Overview</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Course Overview</td>
<td>[Tsui 07] Ch. 1-3; [Pressman 09] Ch. 1</td>
<td>RQ 1</td>
</tr>
<tr>
<td>2</td>
<td>Case Discussion</td>
<td>[Iansiti 90]</td>
<td>A1: OBU Case</td>
</tr>
<tr>
<td>4</td>
<td>Software Development Life Cycles</td>
<td>[STSC 96]; [Walton 04]</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Introduction to Processes &amp; How to Choose</td>
<td>[Pressman 09] Ch. 2 &amp; 3; [Tsui 07] Ch. 4 &amp; 5, skim Ch. 7; [Ahern 04]; [Wells 04]; [Norton 05]; [Booch 98]; [Open UP]; [Ambler 09]; [Lattanze 05]; [Schloh 96]; [Iansiti 90] Recommended: [Abrahamsson 02] Supplemental: [Narsu 02]; [Elssamadisy 01]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Process Frameworks &amp; How to Choose</td>
<td>[Rockwood]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Case Discussion</td>
<td>[de Neufville 94]; [Iansiti 90]</td>
<td>A2: SDLC Case</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Requirements Management</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 7 | Requirements Management | [Pressman 09] Ch. 5-7; [Tsui 07] Ch. 6; [Christel 92]; [Barbacci 03]  
Supplemental: [IEEE 98]; [Weigers 95]; [Kelly 04]; [Weigers 99]; CCB charter  
template; Change control process; past MSE projects |
|   |   |   |
| 8 | Case Discussion | [Fricker 06]; [Weigers 95] | A3: Eliciting & Communicating Requirements |
|   |   |   |
|   | Risk Management |   |
| 9 | Identifying & Managing Software Risk | [Pressman 09] Ch. 25; [Van Scoy 92]  
Skim: [Will 04]; [Carr 93]; [Nelson 08]; [Williams 99] | RQ 3  
Paper topic |
|   |   |   |
|   |   |   |
| 11 | Introduction & Function Point Analysis | [Pressman 09] Ch. 25 & 26  
Skim: [Longstreet 02] |
| 12 | Support for Expert Estimation | [Jørgensen 09]; [Stellman 05]; [Miranda 01] | A5: Function Point Estimate |
| 13 | Parametric Cost Models | [STSC 09]; [Reifer 02]  
Skim: [ISPA 08]; [CSE 00] | RQ 4 |
| 14 | Dealing with Cost Estimation Uncertainties | [Book 01]; [Miranda 08]; [CSE 00] |
| 15 | End to End Estimation Process | [Miranda 02] | RQ 5 |
|   | Managing Customer Expectations |   |
| 16 | Expectation Management: Managing Customer Expectations | [Boehm 00] | RQ 6;  
Paper Outline |
| 17 | Case Discussion | [Hoover 10] | A6: Gigaplex TCP Case |
|   |   |   |
|   | Planning, Tracking, and Oversight |   |
| 18 | Introduction; Critical Path | [Tsui 07] Ch. 11 & 13; [DAU 01] Ch. 6,  
skim Ch. 3-5; [Pressman 09] Ch. 24 |
| 19 | Milestone Planning | [Andersen 96] | A7: Critical Path |
| 20 | Project Tracking & Reporting | [Fleming 98]; [Cabri 06]; [Miranda 06]  
Skim: [DoD 03] | RQ 7 |
|   | Managing Technical People, Leadership, and Teamwork |   |
| 21 | Managing Technical People and Leadership Errors | [Horowitz 02]; [McCarthy 03] [Thite 99];  
[Goldman 00]  
Supplemental: [Berry 02] | RQ 8 |
| 22 | Case Discussion | [Amabile 03] | A8: MTP Case |
Quality Assurance

| 23 | Building Quality into Software: Defining Processes | [Pressman 09] Ch. 14, 16 & 23; [Tsui 07] Ch. 8 & 10; [IEEE 02]; [Fagan 02] Skim: [Fagan 99]; [Pressman 09] Ch. 15, 17, 18, 19, 20 & 22 | RQ 9 |
| 24 | Architecture as a Strategic Asset | [Lurie 02] |
| 25 | Case Discussion | [Sutherland 04] |

Current Topics

| 26 | Open Source | [Capek 05]; [Neus 05]; [Gurbani 06] |
| 27 | Cyclomatic Complexity | [Pressman 09] Ch. 13 & 14; [NASA 89]; [Van Dorn 97]; [Basili 87]; [Varadan 95] |

Bibliography


[Carr 93] Carr, Marvin J.; Konda, Suresh L.; Monarch, Ira; Ulrich, F. Carol; & Walker, Clay F. Taxonomy-Based Risk


