1. Instructor Information

Dr. LiGuo Huang

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Office Hours: TBD

Email communication: I strive to respond to course-related emails within 24 hours on weekdays. Inevitably I may overlook some messages; if more than 24 hours has passed during the week days, feel free to send me a reminder.

2. Course Description

Successful software projects need to deal with people and economic considerations, as well as technical considerations. The primary objective of the SMU software engineering education program is to prepare students for leadership careers in the field. Good software engineering leadership requires an understanding of three major areas: software technology, economic factors, and human relations. The learning objectives of this course are to enable the student to understand the fundamental principles underlying software process management and economics; to analyze management situations via case studies; to analyze software cost/schedule tradeoff issues via software cost estimation tools and microeconomic techniques; and to apply the principles and techniques to practical situations. This course assumes that students have relevant background in software technology, and concentrates on the economic and human factors and shows how they interplay with software factors in software life cycle processes. CS8340 will be organized as a research seminar, with active student participation. It is well suited for graduate students who want to gain a firsthand experience on advanced software engineering process and economics research and practices. In addition, this course also attempts to enhance the advanced research component in the SMU's software engineering program. For students in SMU's MS/SE program, this course can be counted either as an "advanced major elective" or as a "general elective" course.

3. Nature of the Course

The course focuses on a set of pervasive management and economic paradigms which are highly valuable software engineering tools: software cost/quality analysis, teambuilding, empowerment, continuous process improvement, business case analysis, win-win situations, production functions, economies of scale, present value, constrained optimization, risk and decision analysis, etc. It does this in the context of new software challenges (e.g., rapid development, rapid change, COTS integration) and new approaches to the software process, including Theory W, the Spiral Model, Model-based (System) Architecting and Software Engineering (MBASE), Incremental Commitment Spiral Model (ICSM), software risk management and agile methods. These are all integrated into a framework of Value-Based Software Engineering (VBSE). The Incremental Commitment Spiral Model (ICSM) is a framework of theory, principles, and practices for integrating human and economic values into software engineering and management practice.

VBSE and the WinWin Spiral process integrate economics and human factors into software development through the fundamental concept of reconciling stakeholder value propositions into a win-win shared vision of the products to be developed and the process for developing them. A software project's success-critical stakeholders generally include users, acquirers, developers, and maintainers; and may also include marketers, venture capitalists, operators, and representatives of the general public.
Theory W project management is based on the fundamental principle that the project manager's principal objective is to Make Everyone a Winner (customers, subordinates, bosses, users, maintainers). The course elaborates this principle into a stakeholder value-based approach which focuses on techniques for creating win-win conditions, negotiation, expectations management, and conflict resolution.

Software risk management is one of the primary Theory W elements: identifying and managing win-lose or lose-lose project risks. It is also the driver of the Spiral Model. The course will cover the discipline of software risk management under six primary sub-topics: risk identification, risk analysis, risk prioritization, risk management planning, risk resolution, and risk monitoring.

Software cost/quality analysis based on COCOMO II Suite provides you with the firsthand experience on a popular cost estimation model/tool interested by many large industrial organizations including IBM, Boeing, Raytheon, Northrop Grumman, etc.

4. Prerequisites

This course requires a background in computer science, engineering or economics. Students with a background in computer science or software engineering with graduate standing is qualified to enroll. However, students majoring in economics, EMIS or other disciplines are welcome to enroll in the class with my permission. If you are interested in the course but unsure if you are eligible to enroll, please contact me. No prior experience with software engineering is required, but even students who have lots of prior experience should find the course engaging.

5. Course Topics

The course covers the following topics:

- Software management and economics trends, goals and issues
- Theories of management and their application to software projects
- People considerations: motivation, win conditions, leadership, teambuilding, group dynamics
- Software Engineering Economics
  - Software cost and schedule estimation; tradeoff and management option analysis.
  - Value-based Software Engineering (VBSE)
  - Software risk management
  - Relevant microeconomic concepts: production functions, economies of scale, present value, constrained optimization, statistical decision theory, risk, and the value of information.
  - Business-case and economic analysis of software products and product lines. (if time permits)
- Software Engineering Processes
  - Software life cycle process models
  - Software life-cycle planning and control; software process model determination; project monitoring and control.
  - Balancing agility and discipline
  - Incremental Commitment Spiral Model (ICSM) and its underlying principles (commitment and accountability, key stakeholder satisficing, incremented process, concurrent engineering, risk-driven activities and content)
- Selected Special topics (if time permits)
  - Economics of software quality/dependability and security
  - Software process maturity models and continuous process improvement
  - Commercial-off-the-shelf (COTS) software management and economics
  - Systems of Systems
6. Selected Student Learning Outcomes

- Understand the fundamental principles underlying software process management and economics;
- Analyze management situations via case studies;
- Analyze software cost/schedule tradeoff issues via software cost estimation tools and microeconomic techniques;
- Apply the software process management and economics principles and techniques to practical situations

7. Textbooks and Course Material

Textbooks and References


Paper Readings

- Electronic Papers

8. Course Tools

- COCOMO®II

9. Workload and Grading

The course grade each student receives will reflect the weighted average of 3-5 homework assignments, two exams, a term paper and a final term paper presentation.

A tentative weight of assignment grading is as follows (Please note that the distribution may be subject to adjustment.):

- Homework (35%)
- Term Paper Outline (2%)
- Term Paper and Presentation (18%)
Homework and Term Project assignments will be posted on the course webpage and submitted onto Canvas. Exams must be submitted in hardcopy. Grades for course assignments (i.e., homework, projects, exams) will be posted on Canvas. Final letter grades will be based on the curve (grade distribution) of the entire class and posted on my.smu.

**Term paper:** Please refer to Term Paper Guidelines for details.

**Assignment Submission:** Please put your Name, SMU ID, Class Section #, Email Address on your title page. In addition, Canvas tends to become slow or unavailable right before the deadline time (depends on your connection speed and traffic to Canvas system). We will not be able to help you if you cannot get your assignment in on time, so submit early. It is your own risk to submit right before the deadline time.

- On-campus students: Homework is due by 11:59pm on the specified due date for on-campus students, unless otherwise noticed.
- Off-campus students: Homework is due by 11:59pm on the specified due date for off-campus students, unless otherwise noticed.

**Late Assignment Submission Policy:** Late homework will receive a 25% penalty per day. In case of emergencies, please talk to me to make special arrangements. If you are out of town for a non-emergency (e.g., an interview), you should arrange to turn in the assignment early, rather than late, to avoid a penalty.

**Collaboration and Attribution:** Collaboration is an essential skill for software engineering. I encourage students to collaborate on discussing and studying the course materials. Please do not, however, share answers, code, designs that solve an assignment directly with other students. Solutions to homework should be written or typed from scratch and must not be pieced together from other students.

**10. Class Attendance and Participation Policy**

**On campus students:** I expect all on-campus students to attend classes and participate in class discussions. I understand that occasionally circumstances may arise to prevent you from attending class. This is fine, but I would appreciate if you send me an email in advance letting me know the reason that you won’t be able to attend class. Chronically missing class is not acceptable, and I reserve the right to penalize the course grade in the event of persistent absence.

**Off campus students:** I expect all off-campus students to first watch the class video for the latest course announcements and lectures before delivering your questions. If questions asked have been clearly announced or addressed in the lecture video, I reserve the right to penalize the course grade due to the missing class attendance.

**11. Academic Integrity**

Academic misconduct of any kind is prohibited by the SMU Student Honor Code. Students must work independently on all individual assignments; collaborating on individual assignments is considered cheating and will be penalized accordingly. All SMU students are responsible for reading and following the SMU Student Honor Code, which prohibits plagiarism of any kind. Some examples of behavior that is not allowed are: copying all or part of someone else's work (by hand or by looking at others’ files, either secretly or if shown), and submitting it as your own; giving another student a copy of your assignment solution; consulting with another student during an exam; and copying text from
published literature without proper attribution. If you have questions about what is allowed, please discuss it with the instructor.

Students who violate University standards of academic integrity are subject to disciplinary sanctions, including failure in the course and suspension from the University. Since dishonesty in any form harms the individual, other students, and the University, policies on academic integrity have been and will be strictly enforced.

12. University Policies

Academic Dishonesty. Academic dishonesty may be defined broadly as a student's misrepresentation of his or her academic work or of the circumstances under which the work is done. This includes plagiarism in all papers, projects, take-home exams, or any other assignments in which the student represents work as being his or her own. It also includes cheating on examinations, unauthorized access to test materials, and aiding another student to cheat or participate in an act of academic dishonesty. Failure to prevent cheating by another may be considered as participation in the dishonest act.

Honor Code. Intellectual integrity and academic honesty are fundamental to the processes of learning and evaluating academic performance; maintaining them is the responsibility of all members of an educational institution. The inculcation of personal standards of honesty and integrity is a goal of education in all the disciplines of the University. The faculty has the responsibility of encouraging and maintaining an atmosphere of academic honesty by being certain that students are aware of the value of it, that they understand the regulations defining it, and that they know the penalties for departing from it. The faculty should, as far as is reasonably possible, assist students in avoiding the temptation to cheat. Faculty must be aware that permitting dishonesty is not open to personal choice. A professor or instructor who is unwilling to act upon offenses is an accessory with the student offender in deteriorating the integrity of the University. Students must share the responsibility for creating and maintaining an atmosphere of honesty and integrity. Students should be aware that personal experience in completing assigned work is essential to learning. Permitting others to prepare their work, using published or unpublished summaries as a substitute for studying required materials, or giving or receiving unauthorized assistance in the preparation of work to be submitted are directly contrary to the honest process of learning. Students who are aware that others in a course are cheating or otherwise acting dishonestly have the responsibility to inform the professor and/or bring an accusation to the Honor Council. Students and faculty must mutually share the knowledge that any dishonest practices permitted will make it more difficult for the honest students to be evaluated and graded fairly, and will damage the integrity of the whole University. Students should recognize that their own interest, and their integrity as individuals, suffer if they condone dishonesty in others.

The Honor System. All undergraduate students at SMU are under the jurisdiction of the Honor Code, and as such will be required to sign a pledge to uphold the Honor Code. The Honor Council is composed of 22 students appointed by the Student Senate to represent the undergraduate schools and classes of the University. The Council's responsibility is to maintain and promote academic honesty. Students are required to warn or to report to the Honor Council or faculty any student suspected of violating the Honor Code, and to inform the instructor of a course in which violations are suspected that he or she may not be achieving an atmosphere conducive to academic honesty. Suspected violations reported to the Honor Council by a student or by an instructor will be investigated and, if the evidence warrants it, a hearing will be held by a Board composed of five members of the Honor Council. Suspected cases of academic dishonesty may be either handled privately by the appropriate faculty member in whose class the alleged infraction occurred, or referred to the Honor Council. Appeals of actions by the Honor Council shall be submitted to the All-University Judicial Council in writing no later than three class days after the hearing. Appeals of actions taken by instructors independently of the Honor Council may be made through the traditional academic routes.
Disability Accommodations:  Students needing academic accommodations for a disability must first register with Disability Accommodations & Success Strategies (DASS). Students can call 214-768-1470 or visit http://www.smu.edu/Provost/SASP/DASS to begin the process. Once approved and registered, students will submit a DASS Accommodation Letter to faculty through the electronic portal DASS Link and then communicate directly with each instructor to make appropriate arrangements. Please note that accommodations are not retroactive and require advance notice to implement.

Religious Observance: Religiously observant students wishing to be absent on holidays that require missing class should notify their professors in writing at the beginning of the semester, and should discuss with them, in advance, acceptable ways of making up any work missed because of the absence (https://www.smu.edu/StudentAffairs/Chaplain/ReligiousHolidays).

Excused Absences for University Extracurricular Activities: Students participating in an officially sanctioned, scheduled University extracurricular activity should be given the opportunity to make up class assignments or other graded assignments missed as a result of their participation. It is the responsibility of the student to make arrangements with the instructor prior to any missed scheduled examination or other missed assignment for making up the work. (See 2018-2019 University Undergraduate Catalogue).

13. Disclaimer

Please note that this syllabus is subject to change based on the learning progress in class during the semester.