MET CS 473 EX - Introduction to Software Engineering
Spring, 2016 - SYLLABUS
808 Comm Av - Lab 3 (Room 266)

Course Description:

Today software systems are developed through the global collaboration of high performance teams. The course provides an in-depth examination of key software engineering techniques. Term project consists of in-process submissions that are thoroughly reviewed among peers, as well as the final delivery of a working system prototype.

The course represents a deliberate attempt to advance several individual disciplines into a systematic approach with a single goal of delivering product more effectively. It is uncharacteristic of a software engineer to be unaware of requirements or peer reviews. Software engineer might not be an expert in system test, although he or she must have a clear concept of how it is done so to be able to contribute, collaborate and lead. Each part of the course offers a significant depth and it is up to you how far you explore each subject.

Course Objectives:

Upon successful completion of this course, you will be prepared to:

- Justify, implement and manage a global product development
- Play an effective role of a Software Engineering Manager in a context of IEEE CSDP (Certified Software Development Practitioner) with a specific emphasis on organizational policies as guiding principles.
- Solicit, define and scope requirements as part of the product backlog grooming.
- Select an estimation method that is appropriate for a specific phase of a product life cycle. Oversee adoption of a consistent methodology to narrow the Cone of Uncertainty.
- Play a role in a peer review, request and provide constructive and concise

comments.

- Support the Scrum delivery framework and become aware of several agile certification paths.
- Evaluate software development tools (approved, allowed, restricted), while following the Magic Quadrant technique.
- Articulate the strategy for system and unit test leading to continuous integration and delivery.
- Structure a project asset library aiming at single-click navigation to a requested artifact.
- Provide leadership to a process program that is using SEI CMMI as an improvement model.

Course Resources:

There are several books referenced throughout the course. These books are *optional*. You do not need to purchase them. Most of the course concepts are expounded through the class notes comprised of some two hundred pages. You will be also required to search through various on-line resources.
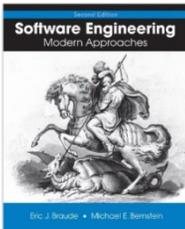
1. Software Engineering – Modern Approaches (2nd edition), by Eric Braude & Michael Bernstein (ISBN # 978-0-471-69208-9). Eric Braude is an Associate Professor of Computer Science at Boston University. His research concerns reliable program construction. His most recent papers appeared in Science of Programming in 2014 and at the Learning@Scale 2015 conference.
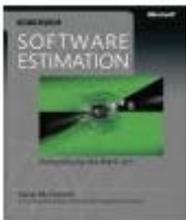
2. Steve McConnell, (2006) Software Estimation: Demystifying the Black Art. Redmond, WA: Microsoft Press, ISBN: 0735605351. Steve McConnell is a well-known industry practitioner, Chief Software Engineer at Construx. Software Development magazine named Steve one of the three most influential people in software industry along with Bill Gates and Linus Torvalds. Steve's book on estimation is available in electronic form and could be delivered instantly.

3. Bose, I., Huang, M-H., & Huang, M. (2006). Jharna Software: The move to Agile. Harvard Case No. HKU613.This case study is used in one of the assignments, where you will apply elements of quantitative analysis and systematic decision making toward agile methodology. Many organizations are looking for a clear path to improve their product delivery with Agile.

Instructor:

Alex Elentukh
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Office Hours & Questions: You will have ample opportunity for questions during class or through email. In addition, I will be available to stay late after class. Finally, I am available for ad-hoc conference call discussions upon request. Do not be surprised to receive a call from me, as I am always interested to learn what you are thinking.

My name is Alex Elentukh, and I will be your instructor for the course. To give you a little background about myself, during my 25 years professional career I taught various software-engineering courses at Boston and Northeastern University and authored numerous papers on quality assurance and software reliability. Most recently taught the MET CS 473 and MET CS633. At EMC, as an Agile coach, I introduced the backlog grooming to improve collaboration between product owners and engineering. As an enterprise architect at Fidelity, I managed the regression-intensive verification used by multiple scrums, cutting the field complaint rate by fifty percent. I also held the positions of QA director at two successful start-ups, Jupiter and Reveal.

Most importantly, I'm here to help - if you have any questions or need anything at all during the course, please don't hesitate to contact me...the most effective way is via email.

Course Grading Information:

Grade Weighting & Grade Conversion:

The following table summarizes the five kinds of graded items along with their weight.

DELIVERABLE	WEIGHT
Class Engagement	10%
Quizzes	10%
Assignments	20%
Term Project	30%
Final Exam	30%

The following table details the translation on a numerical grade to a letter grade.

LETTER GRADE	NUMERICAL GRADE
A	>=95 – <=100
A-	>=90 - <95
B+	>=85 - <90
B	>=80 - <85
B-	>=77 - <80
C+	>=74 - <77
C	>=70 - <74
C-	>=65 - <70

Class Engagement:

Class Discussions: A large part of the overall learning experience is gained through discussions and participation amongst the class. The intent here is to encourage a meaningful participation during lectures and through the discussion board. Class discussions are optional but students are encouraged to post comments toward several predefined topics.

Peer Reviews: All in-process artifacts (e.g. requirements and test cases), as well as the final deliverable (code), shall be peer reviewed. Providing constructive and concise comments is a part of the defined process elaborated in the class. Each student actively participates in peer reviews, submits a predefined deliverable and incorporates suggested changes from peers.

Attendance Policy: Attendance is expected at all class meetings. Attendance becomes a factor in the overall Class Engagement grade. You are responsible for all material discussed in class. Please respect your classmates by silencing your cell phones and other electronic devices before class begins.

Quizzes

Quizzes in this course are an important method to learn new material. Quizzes complement other methods, assignments, discussions, and term project. Quizzes offer a slightly different path and angle toward the same course concepts. Yes&No answers bear no judgment. They are impersonal, which is quite different from assignments where, in many cases, there is no right or wrong answer.

Assignments

Assignments encourage you to extrapolate from the course material and from your own experiences. Researching the topic and responding questions about grey-area-scenarios will force you to think independently. You should time box your assignments, as they illustrate key points, exploring too many details will deviate from a big picture focus.

Term Project

The purpose of the term project is to follow key phases of software product development. It is a chance to pilot, adopt and implement the best practices covered in the course. In today's environment, collaboration is imperative as it drives the overall effectiveness of a software project. Peer reviews are a critical activity that allows teams to collaborate through finding defects in each other's work products. After participating in this activity in a controlled environment, you will be able to apply your skills later to a real situation.

Final Exam:

You will have three hours to complete the final exam; there should be plenty of time. The final exam will be open book, open notes.

(1) **Short answers:** A combination of multiple choices/answers based on quizzes from course modules.

(2) **Essays:** Short essays/responses which will focus on in-depth lecture discussions and on practical knowledge gained throughout Term Project.

You should expect no surprises on your final exam, as it includes no questions that are not covered during the class.

The last question on your final exam is as follows. *As one of the goals of this course is for you to adopt at your day job - some techniques we covered in the class. Which of the best practices from the course do you plan to adopt?*

Here is one of the responses. While there are many elements of this course that I expect to directly apply to my current job, there are two that stand out more than others. Those two are peer reviews and estimation techniques. My company performs peer reviews for functional specifications as well as technical designs, but we do not conduct code reviews. I think if we were to implement a static analysis of team code, we would detect potential defects sooner. We would also have a chance to suggest more uniform coding best practices so there would be a greater consistency of code among developers. It would also aid in cross-training, in which my team is severely lacking.

Here is another response. The tool evaluation matrix and magic quadrant will be extremely valuable to me in the future as I find that the organization I work for tends to acquire a multitude of tools which do the same exact thing and it needs to be revised in order to standardize their use to become more efficient and save money at the same time. Thank you for the toolkit you have provided throughout the semester!

Academic Integrity:

Academic conduct in general, and MET College rule in particular, require that all references and uses of the work of others must be clearly cited. All instances of plagiarism must be reported to the College for action. For the full text of the academic conduct code, please check
http://www.bu.edu/met/for-students/met-policies-procedures- resources/academic-conduct-code/

Course Map and Schedule:

The following schedule is tentative, and is a subject to change according to the progress of the class and the feedback from students. It covers six modules with one lecture per module. (*) designates optional activity contributing to Class Engagement.

Module	Module Topic	Reading References	Discussion Topics Post Comments (*)	Individual Assignments	Quizzes	Term Project	Live Classroom Lab 3 Room 266
Module 1 Jan 23 - Feb 5 *DELIVERABLES DUE DATE:* *Friday, Feb 5th,* *6:00 AM EST*	Globalization Trends Requirements Engineering Backlog Grooming & Scoping Engineering Management	Module 1 Course Notes Karl Wiegers Pivotal tutorial Git tutorial IEEE CSDP BOK	Introduce yourself and welcome other students Compare Company Policies of Google and GM Document a Policy for your Project	• Pre-class Student Intro attached to Class Discussion tab Individual Assignments: • A 1 "Provide alternative definitions" • A 2 " Improve Requirement" • A 3 "Benchmark Grooming process" • A 4 "Motivation Principle"	Quiz 1	• Register with Pivotal • Create GIT account • Propose Project Scope • Propose team's composition	Saturday, Jan23[d], 9 am - 4 pm EST *Course Lectures Assignments & Quizzes*

Module 2
 	
Feb 6 - 19
 	
DELIVERABLES DUE DATE:
Friday, Feb 19th,
6:00 AM EST
	Software Configuration Management (SCM)
	
	Estimation
		Module 2 Course Notes
		
		GitHub tutorial
		
		Steve McConnell
		  Section4 "Cone"
		  Section 11 "Analogy"
		  Section 12.3 "Story Points
			Comment on a paper "The Art of Changing the History", see Assignment 2, Question 2
			
			Respond common question, while teaching estimation class
				• A 1 "Analyze GIT's branching & merging"
				
				• A 2 "Select estimation strategy"
				
				• A3 "Select the Best PM"
					Quiz 2	• Document Personas
						
						• Develop Requirements in Pivotal
							Saturday, Feb 6th, 9 am - 4 pm EST
							
							Course Lectures Assignments & Quizzes

Module 3 Feb 20 - Mar 4 *DELIVERABLES DUE DATE:* *Friday, Mar 4th,* *6:00 AM EST*	Agile Peer Reviews	Module 3 Course Notes Scrum Guide HBS Case, JharnaSW	Give a hand to a Moderator in a contentious peer review	• A 1 "Sequence Stories" • A 2 "Analyze Velocities" • A 3 " Select Agile adoption strategy based on Jharna case • A4 "Write critical comments in a predefined format"	Quiz 3	• Document Selected Use Cases • Provide Estimation record • Compile CI List	Saturday, Feb 20th, 9 am - 4 pm EST *Course Lectures Assignments & Quizzes*

Module 4 Mar 5 - 18 *DELIVERABLES DUE DATE:* *Friday, Mar 18th,* *6:00 AM EST*	Elements of Software Design Common Tools Supporting Common Process	Module 4 Course Notes Eric Braude, Ch. 16	How to manage a repository of best coding practices	• A1 "Arrive at a decision based on Cost Of Delay" • A2 "Position 28 software tools into 9 categories"	Quiz 4	• Converge on a Components Interaction diagram • Document State Transitions	Saturday, Mar 5th, 9 am - 4 pm EST *Course Lectures Assignments & Quizzes*
Module 5 Mar 19 - Apr 1 *DELIVERABLES DUE DATE:* *Friday, Apr 1st,* *6:00 AM EST*	Test Essentials Unit Test Continuous Delivery	Module 5 Course Notes Glenford Myers Jez Humble	Link two diverse notions from Andy Grove and Jez Humble	• A1 "Analyze architecture of a test case repository" • A2 "Advance test cases from release into regression" • A3 "Outline Test Cases" • A4 "Develop an Argument" • A5 "Explain how SOA facilitates CD"	Quiz 5	• Transform mock-ups into wireframes	Saturday, Mar 19th, 9 am - 4 pm EST *Course Lectures Assignments & Quizzes*
Module 6 Apr 2 - 8 *DELIVERABLES DUE DATE:* *Friday, Apr 8th,* *6:00 AM EST*	Process Architecture Process Improvement Course review in preparation to Final Exam	Module 6 Course Notes CMMI, version 1.3 ISO 9001 2008	Outline a path toward an effective adoption of a new process	• A 1 "Off shoring Hidden Costs" (*) • A2 "Spread features evenly across t-shirt sizes" (*) • A3 "Ship Decision" (*)	Quiz 6 (*)	• Develop test cases in a standard format • Reduce data-driven combinations using Allpairs • Submit draft report • Present basic functionality of Term Project	Saturday, Apr 2d, 9 am - 4 pm EST *Course Lectures Assignments & Quizzes* *Each Team Presentations*
April 9 *DELIVERABLES DUE DATE:* *Saturday, Apr 9th,* *6:00 AM EST*						• Submit final report	Saturday, Apr 9th, 10 am - 1 pm EST *Final Exam*