

Developing Software Engineering Curriculum for the Flat World: a Case Study

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Software Engineering in the new Century

- Globalization impact – outsourcing
- More complex and sophisticated software systems – teams with different disciplines
- Software Economy – The world is flat
- Infrastructure – people, process, and technology





New Opportunities

- Architects
- Process Engineers
- Quality Engineers
- Project Managers



"Yeah, it is a rocket science. Launch your future with ECS"



Critical Skills Needed for Software Engineers in a Flat World

- Ability to communicate clearly (both oral and written)
- Ability to work as part of a team
- Fundamental computing knowledge
- Ability to learn new technologies
- Knowledge of front-end of software development (requirements and high-level design)
- Quality control
- Knowledge of and skills in using software process





Challenges in Developing MSE Curriculum

- What will be included in the curriculum and in what order?
- How to integrate the industry best practices into the curriculum?
- How to assess if the learning objectives are achieved?
- How to ensure our faculty have the current knowledge needed?





Our Strategy

- Alliance with a credible institution:
SEI and CMMI





The Premise

The quality of a system is highly influenced by the quality of the process used to acquire, develop, and maintain it.

This premise implies a focus on processes as well as on products.



Components of CMMI[©] -SE/SW/HW

CMMI[©]

Process Management

- Organizational Process Focus
- Organizational Process Definition
- Organizational Training
- Organizational Process Performance
- Organizational Innovation and Deployment

Project Management

- Project Planning
- Project Monitoring and Control
- Supplier Agreement Mgmt.
- Integrated Project Mgmt.
- Risk Management
- Quantitative Project Mgmt.

Engineering

- Requirements Management
- Requirements Development
- Technical Solution
- Product Integration
- Verification
- Validation

Support

- Configuration Mgmt.
- Process and Product Quality Assurance
- Measurement & Analysis
- Decision Analysis and Resolution
- Causal Analysis and Resolution





Why CMMI?

- It reflects the best practices in the community.
- Contents cover core knowledge body.
- SEI has a full product suite with training.
- It has been adopted globally.
- It can be used as the thread to link our course elements.





Who are our targeted students?

- Audience:
 - CS Background w. Software Emphasis
 - Software Industry Experiences (working professionals who are busy)





Another important decision

- Make the program entirely online:
“Any time and any where.”





Bridging the Gap the Fullerton way, by:

- Having a very active industry board.
- Getting feedback from our students
- Obtaining the industry best practices via SEI
– all our faculty received SEI training
- Conducting workshops like this one





The Main Objective of the MSE program

- To train our students so they become software professionals who
 1. Are good architects
 2. Understand the Product/Software Development Process ...So they can be successful in the new flat world.





The MSE Curriculum (I)

CPSC 541 - Systems and Software Standards and Requirements (3)

- Requirement Engineering
- Software Standards
- CMMI focus: REQM, RD, GP 3.1

CPSC 544 - Software Process Definition (3)

- IDEAL
- CMMI focus: Process Management





The MSE Curriculum (II)

CPSC 545 - Software Design and Architecture (3)

- CMMI Focus: TS and other Engineering Process Areas

CPSC-546 - Software Project Management (3)

- CMMI Focus: Project Mgmt. PA's and Support PA's.





The MSE Curriculum (III)

CPSC 542 - Software Verification and Validation (3)

- CMMI Focus: VER and VAL

CPSC 547-Software Measurement (3)

- Software metrics
- SPC and other statistical techniques applications in Software
- CMMI Focus: MA, High Maturity PA's.





The MSE Curriculum (IV)

CPSC 543 - Software Maintenance (3)

- CMMI Focus: Engineering PA's.

CPSC 548 – Professional, Ethical and Legal Issues for Software Engineers (3)

- professional software engineering ethics
- team psychology
- legal issues pertaining to software development





The MSE Curriculum (V)

CPSC 597 (I and II) - Graduate Project (6)
- Capstone experience





Summary

- Process Track:
544 – 546 – 547
- Engineering Track:
541- 545 – 542 – 543

CMMI is a common thread connecting all courses together





Learning on-line

- Blackboard
- Asynchronous learning
- Team project
- Online discussion
- Audio and video used





We have built a strong program

- Two cohorts (100 students) have graduated since Fall 2004. We have about 100 right now.
- We have about 160 enrolled students.
- Diverse students (regions, sectors, countries)





Student Feedback (I):

“One thing that I would like to keep in the course and MSE program is the way the projects are group-oriented. I enjoyed working with my group, feeding off their ideas, and learning from their experiences.”





Student Feedback (II):

“Audio lectures that provide great help for MSE on-line students. Sometimes, reading textbooks and other reference materials still confuse, but with audio that professor explains more about a certain topic and that is a big HELP. Really, thanks for that.”





Student Feedback: (III)

” The project is divided well and allows us to get a different taste of each topic.”

“I would like to keep the flexibility of not being on-site for the courses/exams; this gives me an ability to cover the material at my own pace and time while working for an organization that is consistently keeping me on its own schedule.”





Student Feedbacks (IV):

“Group project is a good way to learn, not only from the course but also from all of the team members’ experiences. I like the exam format, because it stimulates thinking and creativity. Also, samples posted on black board and audios are very useful.”

“The text and the lecture notes seemed to mesh well. Also, having a place to discuss certain lecture topics helped tremendously.”





Student Feedbacks: (V)

“While face-to-face communication is often more efficient, the use of email and discussion boards is still an effective way to resolve problems and have questions answered. My questions were always answered promptly, and it was nice to see other student’s questions, and the subsequent answers, on the discussion board.”





Student Feedbacks (VI)

“I like the way the team projects are delivered to the professor for review, and how the professor provides feedback and then the team has the opportunity to update the product based on the feedback. It is a good learning mechanism, plus it takes some of the pressure off the initial delivery of the product.”





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Master of Science in Software Engineering

The MSE program admits new students in the fall semester only. Applications for Fall 2008 are accepted now.
Click [here](#) to apply.

Graduate Information Session
May 10
10:00 am - 12:00 pm
Room CS - 300

Master of Science in Software Engineering (MSE)
Department of Computer Science
California State University, Fullerton

The Department of Computer Science at California State

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In case you cannot see it:

<http://www.fullerton.edu/ecs/mse>



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Thank you. Are there any
questions?



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