

Implementing MSwA2010 at Stevens Institute of Technology

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Outline

1. Overview of our MSwA program
2. Where we started at Stevens
3. Modifications and additions to our MSwE curriculum
4. Current status and future plans
5. Opportunities for you

Overview of Our MSwA Program

- ▶ MS in Software Engineering (MSwE) with a concentration in Software Assurance
- ▶ 6 required courses
 - ▶ Required courses from our MSwE program
- ▶ 2 tracks, 4 courses each:
 - ▶ Developing Trusted Systems
 - ▶ Managing Trusted Systems

<http://stevens.edu/softwareassurance>

2 Graduate Certificates

- ▶ **Development of Trusted Software Systems**
 - ▶ 4 courses (may be applied to MSwA)
 - ▶ Assumes some software development experience
- ▶ **Acquisition and Management of Trusted Software Systems**
 - ▶ 4 courses (may be applied to MSwA)
 - ▶ Assumes some familiarity with software engineering practices

Where We Started at Stevens

- ▶ MSwE program consistent with GSwE2009
 - ▶ www.gswe2009.org
 - ▶ Adopted by ACM and IEEE-CS
- ▶ MS and graduate certificate in Systems Engineering Security
 - ▶ includes 2 useful courses for MSwA:
 - SES 602 Secure Systems Foundations
 - SES 603 Secure Systems Laboratory

Mapping Topics to Courses

	Courses				
Core Topics	533	540	556	564	...
I.1 Software Lifecycle Processes		<input type="checkbox"/>			
I.2 Software Assurance Processes and Practices		<input type="checkbox"/> +			
...					
6.2 Assured Software Development			*	<input type="checkbox"/> +	
...					

Modifications and Additions to our MSwE Curriculum

▶ Additions:

- ▶ 1 new course created for program
- ▶ 2 courses from another program at Stevens

▶ Modifications:

- ▶ New material or examples in 6 existing courses
- ▶ Some courses required more modification than others
 - ▶ Appropriate choices of examples and exercises
 - ▶ Some new topics
 - ▶ All changes are consistent with the mission of our program

New Course: SSW 556 Software Development for Trusted Systems

Outcomes: After completing this course students will be able to:

1. (Comprehension) describe common vulnerabilities of software
2. (Comprehension) understand the capabilities and limitations of methods and tools for software analysis
3. (Application) create and maintain trustworthy software, free from known vulnerabilities such as incomplete input validation or buffer overflows
4. (Application) analyze software to find vulnerabilities using static analysis tools and code reading techniques, such as inspections
5. (Application) test software for vulnerabilities and software assurance requirements
6. (Application) use threat models, attack patterns, and misuse/abuse cases during software and system testing

Textbooks for **SSW 556**

- ▶ *Secure and Resilient Software Development* by Mark S. Merkow and Lakshmikanth Raghavan, CRC Press, June 2010, ISBN: 9781439826966
- ▶ *Secure Coding in C and C++* by Robert C. Seacord, Addison-Wesley 2005, ISBN 0321335724

Sample Exercises in SSW 556

- ▶ Describe prevention methods for OWASP top 10
- ▶ Review and repair flawed code for buffer overflow, input validation and memory management flaws
- ▶ Describe vulnerabilities that can and cannot be detected by static analysis
- ▶ Describe penetration tests for a given system
- ▶ Perform fuzz testing

Modified Course: SSW 687 Acquisition and Management of Large Software Systems

- ▶ Existing course dealt with:
 - ▶ differences between new systems and evolving systems
 - ▶ differences between developed and acquired systems
 - ▶ issues arising from size and complexity of large and very large systems
- ▶ Modifications needed:
 - ▶ additional risks related to assurance
 - ▶ additional practices needed to ensure assurance
 - ▶ making the business case for assurance (Topic 4.1)
 - ▶ compliance considerations for assurance (Topic 4.3)

Resulting MSwA Program

- ▶ MS in Software Engineering (MSwE) with a concentration in Software Assurance
- ▶ 6 required courses
 - ▶ Required courses from our MSwE program
- ▶ 2 tracks, 4 courses each:
 - ▶ Developing Trusted Systems
 - ▶ includes **SSW 556 Software Development for Trusted Systems**
 - ▶ Managing Trusted Systems
 - ▶ includes **SSW 687 Acquisition and Management of Large Software Systems**

Resulting 2 Graduate Certificates

- ▶ **Development of Trusted Software Systems**
 - ▶ 4 courses (may be applied to MSwA)
 - ▶ Assumes some software development experience
 - ▶ Includes **SSW 556 Software Development for Trusted Systems**

- ▶ **Acquisition and Management of Trusted Software Systems**
 - ▶ 4 courses (may be applied to MSwA)
 - ▶ Assumes some familiarity with software engineering practices
 - ▶ includes **SSW 687 Acquisition and Management of Large Software Systems**

How Did we Fit 7 Courses into 3?

- ▶ We already had a MSwE program that was partially oriented towards assurance and trust
- ▶ We modified some of our existing courses to include some of the new material
- ▶ We created 2 tracks:
 - ▶ Developer track does not include all the management material
 - ▶ Management track does not include all the developer material

Current Status and Future Plans

- ▶ MSwA tracks, certificates and new course proposed to our Graduate Curriculum Committee
- ▶ **SSW 687 Acquisition and Management of Large Software Systems** offered in Washington, DC **October 12-16, 2010**
- ▶ **SSW 556 Software Development for Trusted Systems** offered in Washington, DC **November 15-19, 2010**
- ▶ SSE 602 and SSE 603 already being offered at Stevens
- ▶ Modifications to other courses rolling out this academic year and next
- ▶ Course supplements will be offered to students who missed the updated versions of courses

Opportunities for You

- ▶ Apply to one of our programs
- ▶ Enroll in our courses
- ▶ Visit our website:
<http://stevens.edu/softwareassurance>
- ▶ Send me email:
mark.ardis@stevens.edu
- ▶ Join the Software Assurance Education group on LinkedIn