Software Engineering Program

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The NPS Software Engineering Program offers graduate education in the principles and practices of software engineering with thesis options of military relevance and significance.

We combine a systems perspective with modeling and design at all levels of representation from capabilities and requirements down to executable code.
Software Engineering Program

Program Objectives

Provide military and civilian graduate students with study in all the relevant levels of software development

Provide the skills needed to plan, design, and implement large-scale software-intensive systems using the best available science and technology

These skills are essential for officers and civilians responsible for acquisition, development or maintenance of defense software
There are 40 courses within the Software Engineering curriculum, the majority of which are either DoD-unique or DoD-relevant.

- Directed study, research seminar, and other courses: 11
- DoD-relevant courses but not unique to NPS: 14
- Preparatory courses: 5
- DoD-unique courses: 10
Software Engineering Program

Required and Semi-Required Courses

3.00 >1 Req. or Semi Req. Course
2.00 1 Req. or Semi Req. Course
1.00 Introductory course
0.00 No Course

Air Force Institute of Technology
California State University - Sacramento
Embry Riddle Aeronautical University
George Mason University
Monmouth University
Naval Postgraduate School
Seattle University
Stevens Institute of Technology

University of Alabama - Huntsville
University of Southern California
University of York

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The MSSWE degree was established at NPS in 1995

All recipients of the MSSWE degree must
- Become competent in Software Engineering core subjects
- Develop advanced expertise in one or more of the following functional areas of Software Engineering:

- Software Requirements Engineering
- Software Design
- Software Construction
- Software Testing
- Software Evolution & Maintenance

- Software Quality Engineering
- Software Engineering Management
- Software Engineering Infrastructure
- Software Engineering Process
The department also offers the MSCS Software Engineering & Architecture track, consisting of two areas of study:

- **Software-Intensive System Development**
  - Software Testing
  - Software Reliability
  - Software Risk Assessment
  - Design of Embedded Real-time Systems
  - Weapon System Software Safety

- **Autonomous Systems**
  - Robotics
  - Learning Systems and Data Mining
  - Language Systems
  - Cognitive Engineering
  - Design of Embedded Real-Time Systems
• First doctoral program in Software Engineering in the world (established in 1998)

• Provides a unique program of study supporting the advancement of Software Engineering principles and technology to DoD researchers and practitioners, enabling them to
  – Acquire skills and knowledge needed to perform state-of-the-art research on issues related to the development of large complex software systems
  – Direct and manage teams of software professionals
## Enrollment Summary

### Software Engineering Program

<table>
<thead>
<tr>
<th>Program</th>
<th>Current Enrollment</th>
<th>Graduates</th>
</tr>
</thead>
<tbody>
<tr>
<td>SWE PhD</td>
<td>26</td>
<td>22</td>
</tr>
<tr>
<td>SWE MS Resident</td>
<td>3</td>
<td>24</td>
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<tr>
<td>SWE MS Distance Learning</td>
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<td>72</td>
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<tr>
<td>CS MS (SWE Track)</td>
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<td>121</td>
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<tr>
<td>SWE Combat System Curriculum</td>
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<td>3</td>
</tr>
<tr>
<td>SWE Certificate</td>
<td>0</td>
<td>28</td>
</tr>
</tbody>
</table>
Committed to providing outreach with the help of Distance Learning technology…

• In addition to resident education, we deliver the same MS and PhD programs in Software Engineering via DL
• 26 faculty including most of the TT have completed IDL (Interactive Distributed Learning) course
  – Using Blackboard to host their course Web sites
• Organizations that fund students to study Software Engineering via DL include SPAWAR, NAVSEA, NSWC, NSA, MDA, Army TACOM, and Asst. Sec. of Army (ALT)
• We also conduct
  – Certificate programs
  – Short courses
Software Engineering Program

- Developing Dependable Software for a System-of-Systems
  - Dr. Butch Caffall, Director, NASA IV&V Facility
- Evolving a Simulation Module Product Line Software Architecture from heterogeneous Model Representations
  - Dr. Kevin Greaney (COL, USA Ret.)
- Improving Software Quality and Management through the Use of SLAs
  - CDR Leonard Gaines, USN, HQ Defense Logistics Agency
- A Formal Application of Safety and Risk Assessment in Software Projects
  - CDR Christopher Williamson, USN
- Holistic framework for establishing interoperability of heterogeneous software development tools
  - COL Joseph Puett, USA
Examples of Recent Master’s Theses

Software Engineering Program

• A Test Methodology for Reliability Assessment of Collaborative Tools
  – Ms. Brenda Powers, SPAWAR

• Convergence of the Naval Information Infrastructure
  – LCDR James Knoll, USN

• A Methodology for Developing Timing Constraints for the Ballistic Missile Defense System
  – CDR Michael Miklaski, USN and CPT Joel Babbitt, USA

• Extending the Computer-aided Software Evolution System (CASES) with Quality Function Deployment (QFD)
  – MAJ Arthur Clomera, USA

• A System Of Systems Interface Hazard Analysis Technique
  – LT Patrick J. Redmond, Royal Australian Air Force