

Naval Postgraduate School  
 Department of Computer Science  
 Graduation Checklist for MSCS Degree (368)  
 6203P Subspecialty Code  
**Version 2020.2**

Name/Rank/Service: \_\_\_\_\_  
 Month/Year Enrolled: \_\_\_\_\_ Projected Graduation Date: \_\_\_\_\_  
 CS Specialization:    AIAS      CO      CSD      SwE      N&M      MOVES

**General Notes:**

- Students are responsible for meeting the requirements and timelines of this checklist.
- Consult the NPS Python Course Catalog for course prerequisites and offerings.
- Use checkboxes for courses already completed and “planned QTR” for future coursework.

**1. Thesis/Capstone:** Proposal must be approved by **end of the 4<sup>th</sup> academic quarter** (not counting Qtr-0). Proposal must be approved in order to take CS0810 thesis research blocks.

Title: \_\_\_\_\_  
 \_\_\_\_\_  
 Advisor(s): \_\_\_\_\_  
 Co-Advisor / Second Reader (circle one): \_\_\_\_\_  
 Joint Thesis Members, if applicable: \_\_\_\_\_

**2. Core Courses:** All of the courses below must be completed or validated to graduate. Students must submit by the end of their 4<sup>th</sup> academic quarter a plan for completing all core courses to the Program Officer and Educational Technician.

<u>Completed</u>	<u>Planned Qtr</u>
___ CS2011 Computing System Principles (4-0)	_____
___ CS3040 Low-Level Programming I (4-2)	_____
___ CS3001 Formal Foundation of Computer Science (4-2)	_____
___ OS3307 Modeling Practices for Computing (4-1)	_____
___ CS3200 Computer Architecture (3-2)	_____
___ CS3021 Intermediate Programming & Data Structures (4-2)	_____
___ CS3502 Computer Communications & Networks (4-2)	_____
___ CS3070 Operating Systems (3-2)	_____
___ CS3600 Introduction to Computer Security (4-2)	_____
___ CS3140 Low-Level Programming II (3-2)	_____
___ CS3101 Theory of Formal Languages and Automata (4-2)	_____
___ CS3310 Artificial Intelligence (4-1)	_____
___ CS4900 Technology & Transformation I (2-0)	_____
___ CS3250 Intro to Cyber Physical Systems (3-2)	_____
___ CS3150 Design and Analysis of Algorithms (4-0)	_____
___ CS3060 Database Systems (3-1)	_____
___ SW3460 Software Methodology (4-2)	_____
___ CS3315 Introduction to Machine Learning and Big Data (3-1)	_____
___ CS3004 Human-Computer Interaction (3-2)	_____
___ CS4903 Research Methods in CS (2-0)	_____

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**3. Specialization:** All CS students must complete one of the following Specialization areas. Variations or combinations of any area are permissible, subject to Specialization Coordinator or Thesis Advisor approval.

- **ARTIFICIAL INTELLIGENCE & AUTONOMOUS SYSTEMS (AIAS):** (Coordinator: Dr. Rowe)  
*Students must take the following AIAS Core Sequence:* Planned QTR
  - \_\_\_ CS4330 Intro to Computer Vision (3-2) \_\_\_\_\_
  - \_\_\_ CS4313 Advanced Robotic Systems (3-2) \_\_\_\_\_
  - \_\_\_ CS4920 Machine Learning in Data Networks (3-1) \_\_\_\_\_
  - \_\_\_ MV4025 Cognitive and Behavioral Models for Simulations (3-2) \_\_\_\_\_

*In addition, students must choose two of the following AIAS electives:*

  - \_\_\_ CY3650 Cyber Data Management and Analytics (4-0) \_\_\_\_\_
  - \_\_\_ CS4317 Language Systems (3-2) \_\_\_\_\_
  - \_\_\_ CS4558 Network Traffic Analysis (3-2) \_\_\_\_\_
  - \_\_\_ CS4677 Computer Forensics (3-2) \_\_\_\_\_
  - \_\_\_ CS49xx Seminar on Advanced Autonomous Systems Topics (4-1) \_\_\_\_\_
  - \_\_\_ IS4205 Big Data Management, Architecture, and Applications (3-2) \_\_\_\_\_
  - \_\_\_ OS4106 Advanced Data Analysis (3-0) \_\_\_\_\_
  - \_\_\_ OA4108 Data Mining (2-2) \_\_\_\_\_
  - \_\_\_ ME4801 Machine Learning for Autonomous Operations (3-2) \_\_\_\_\_
  
- **CYBER OPERATIONS (CO):** (Coordinator: Dr. Irvine)  
*Students must take the following CO Core Sequence:* Planned QTR
  - \_\_\_ CS3690 Network Security (4-1) \_\_\_\_\_
  - \_\_\_ CS4679 Advances in Cyber Security Operations (4-1) \_\_\_\_\_
  - \_\_\_ CY4700 Applied Defensive Cyber Operations (3-3) \_\_\_\_\_
  - \_\_\_ CY4710 Adversarial Cyber Operations (3-3) \_\_\_\_\_

*In addition, students must choose two of the following CO electives:*

  - \_\_\_ CS4558 Network Traffic Analysis (3-2) \_\_\_\_\_
  - \_\_\_ CS4600 Secure Computer Systems (3-2) \_\_\_\_\_
  - \_\_\_ CS4648 Advanced Cyber Munitions (3-2) \_\_\_\_\_
  - \_\_\_ CS4678 Advanced Cyber Vulnerability Assessment (4-2) \_\_\_\_\_
  - \_\_\_ CS4684 Cyber Security Incident Response & Recovery (3-2) \_\_\_\_\_

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- **CYBER SECURITY & DEFENSE (CSD):** (Coordinator: Dr. Irvine)

<b><i>Students must take the following CSD Core Sequence:</i></b>	<u>Planned QTR</u>
___ CS3670 Secure Management of Systems (3-2)	_____
___ CS3690 Network Security (4-1)	_____
___ CS4600 Secure Computer Systems (3-2)	_____
___ CY4700 Applied Defensive Cyber Operations (3-3)	_____

***In addition, students must choose two of the following CSD electives:***

___ CS4558 Network Traffic Analysis (3-2)	_____
___ CS4615 Formal Analysis of Cryptographic Protocols (3-1)	_____
___ CS4650 Fundamentals of Information System Security Engineering (3-1)	_____
___ CS4680 Introduction to Certification and Accreditation (3-2)	_____
___ CS4684 Cyber Security Incident Response & Recovery (3-2)	_____
___ CS4690 Security for Cyber Physical Systems (3-1)	_____

- **MOVES:** (Coordinator: Dr. C. Darken)

Students interested in a CS degree with a focus on Modeling, Virtual Environments and Simulation (MOVES) may choose the MOVES Option as their Specialization. ***Students will work with their Specialization Coordinator or Thesis Advisor to create a six course sequence applicable to this specialization.*** List course and Planned QTR, if applicable:


- **NETWORK & MOBILITY (N&M):** (Coordinator: Dr. Xie)

<b><i>Students must choose six of the following N&amp;M electives:</i></b>	<u>Planned QTR</u>
___ CS4552 Robust and Secure Network Design (3-2)	_____
___ CS4554 Tactical network Modeling & Survivability (3-2)	_____
___ CS4555 Machine Learning in Data Networks (3-2)	_____
___ CS4558 Network Traffic Analysis (3-2)	_____
___ CS4535 Mobile Devices (3-2)	_____
___ CS4537 5G and Wireless Data Services (3-2)	_____
___ CS4538 Mobile Device and Wireless Security (3-2)	_____

\*\*A student may substitute up to two of these electives to support their thesis topic, as approved by the Specialization Coordinator or Thesis Advisor (list course *and* Planned QTR, if applicable):

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• **SOFTWARE ENGINEERING (SwE):**

(Coordinator: Dr. Luqi)

*Students must choose six of the following SwE electives:*

Planned QTR

<input type="checkbox"/> SW4520 Advanced Software Engineering (3-0)	_____
<input type="checkbox"/> SW4530 Software Engineering R&D in DoD (3-1)	_____
<input type="checkbox"/> SW4582 Weapon System Software Safety (3-1)	_____
<input type="checkbox"/> SW4590 Software Architecture (3-1)	_____
<input type="checkbox"/> SW4800 Directed Study in Advanced Software Engineering (0-V)	_____
<input type="checkbox"/> SW3800 Directed Study in Software Engineering (0-V)	_____
<input type="checkbox"/> CS3690 Network Security (4-1)	_____
<input type="checkbox"/> CS3910 Science of Programming (TBD)	_____
<input type="checkbox"/> CS4313 Advanced Robotic Systems (3-2)	_____
<input type="checkbox"/> CS4552 Network Design and Programming (3-3)	_____
<input type="checkbox"/> CS4615 Cryptographic Protocol Design and Attacks (3-1)	_____
<input type="checkbox"/> CS4670 Quantum Computing (4-0)	_____
<input type="checkbox"/> CS4678 Advanced Cyber Vulnerability Assessment (4-2)	_____
<input type="checkbox"/> CS4684 Cyber Security Incident Response and Recovery (3-2)	_____
<input type="checkbox"/> MV4025 Cognitive and Behavioral Modeling for Simulations (3-2)	_____
<input type="checkbox"/> MV4655 Introduction to Joint Combat Modeling (4-0)	_____
<input type="checkbox"/> OS4118 Statistical and Machine Learning (3-0)	_____
<input type="checkbox"/> CY3650 Cyber Data Management and Analytics (4-0)	_____
<input type="checkbox"/> CY4710 Adversarial Cyberspace Operations (3-3)	_____
<input type="checkbox"/> SE4003 Systems Software Engineering (3-2)	_____
<input type="checkbox"/> AE4830 Spacecraft Systems I (4-1)	_____
<input type="checkbox"/> AE4860 Military Satellite Communications (3-0)	_____
<input type="checkbox"/> SS3613 Military Satellite Communications (3-0)	_____

**4. Breadth Elective:** *All CS students must complete one breadth elective (3000 or 4000 level general elective consisting of any course not in the core nor taken to fulfill a specialization requirement). This course is listed below:*

\_\_\_\_\_

**5. Additional Military Requirements:**

**All U.S. Navy Line Officer students (except Engineering Duty Officers) must complete JPME Phase 1:**

<input type="checkbox"/> NW3230 Strategy & Policy (4-2)	_____
<input type="checkbox"/> NW3275 Joint Maritime Operations Part 1 (4-0)	_____
<input type="checkbox"/> NW3276 Joint Maritime Operations Part 2 (2-2)	_____
<input type="checkbox"/> NW3285 National Security Decision Making (4-0)	_____

**All U.S. Marine Corps students (may be dropped with concurrence of the Senior Marine Office; optional for U.S. Army students):**

<input type="checkbox"/> MN3331 Principles of System Acquisition & Program Management (5-1)	_____
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<b>International Military students (as required by the International Office):</b>	<u>Planned QTR</u>
<input type="checkbox"/> IT1500 Informational Program Seminar for International Officers (4-0)	_____
<input type="checkbox"/> IT1600 Communication Skills for International Officers (3-0)	_____
<input type="checkbox"/> IT1700 Academic Writing for International Officers (2-0)	_____

**6. Credit Hour Requirements:**

- 40 graduate credit hours at 3000 or 4000 level, with at least 12 hours at the 4000 level
- 28 of the 40 graduate credit hours must be in CS, MOVES, SW courses

**7. Departmental Policy on Directed Study Coursework:** Students are not restricted in the number of Directed Studies they may pursue, provided the Directed Study is for a valid course or proposal approved by the sponsoring instructor. Any Directed Study intended to fulfill a track requirement must be approved by the cognizant track coordinator.

**8. Departmental Policy on Allowable Thesis Blocks:** Provided all other graduation requirements will be met per this checklist, students may petition the Academic Associate for additional thesis blocks as their matrix allows (due to course validations). Additional time for thesis work is expected to add commensurately to rigor and depth of the final product.

**9. Student Certification:** I certify that the information on this form is correct, and that I have completed all requirements for the MSCS degree, with any course deviations from my Specialization sequence listed below.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

**10. Specialization Coordinator or Thesis Advisor approval:** Specialization courses approved.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

**11. Program Officer final review:** Checklist complete.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_