Naval Postgraduate School
Department of Computer Science
Graduation Checklist for MSCS Degree (368)
6203P Subspecialty Code
(Revised: SUMMER AY18)

Name/Rank/Service: ____________________________________________
Month/Year Enrolled: ____________________________________________
Projected Graduation Date: _______________________________________
CS Specialization: ______________________________________________

1. Thesis/Capstone: proposal must be approved by end the 4th 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 4th academic quarter a plan for completing all core courses not yet taken as part of their Specialization selection, and also populate their course matrix in Python.

<table>
<thead>
<tr>
<th>Completed</th>
<th>Planned Qtr</th>
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<tbody>
<tr>
<td>CS2011 Computing System Principles (4-0) (F/Sp)</td>
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<tr>
<td>CS3040 Low-Level Programming I (4-2) (F/Sp)</td>
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<td>CS3025 Formal Foundation of Computer Science (4-2) (F/Sp)</td>
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<td>OS3307 Modeling Practices for Computing (4-1) (F/Sp)</td>
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<tr>
<td>CS3200 Computer Architecture (3-2) (W/S)</td>
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<td>CS3021 Intermediate Programming &amp; Data Structures (4-2) (W/S)</td>
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<td>CS3502 Computer Communications &amp; Networks (4-2) (W/S)</td>
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<td>CS3070 Operating Systems (3-2) (W/S)</td>
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<td>CS4900 Technology &amp; Transformation (2-0) (W/S)</td>
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<tr>
<td>CS3600 Introduction to Computer Security (4-2) (Fall/Win/Spr/Sum)</td>
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<td>CS3140 Low-Level Programming II (3-2) (F/Sp)</td>
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<td>CS3101 Theory of Formal Languages and Automata (4-2) (F/Sp)</td>
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<td>CS3310 Artificial Intelligence (4-1) (F/Sp)</td>
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<td>CS3250 Intro to Cyber Physical Systems (3-2) (W/S)</td>
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<td>CS3150 Design and Analysis of Algorithms (3-2) (W/S)</td>
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<td>CS3315 Big Data and Machine Learning (3-1) (Fall/Spr)</td>
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<td>CS3060 Database Systems (3-1) (W/S)</td>
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<td>SW3460 Software Methodology (4-2) (F/Sp)</td>
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<tr>
<td>CS3315 Big Data and Machine Learning (3-1) (F/Sp)</td>
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<td>CS3004 Human Computer Sys. Interaction (3-2) (F/Sp)</td>
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3. Specialization: All CS students must complete one of the following Specialization areas. Circle choice, and initial each completed course or annotate when it will be taken. Variations or combinations of any area are permissible, subject to Coordinator approval. See the NPS catalog for prerequisites and offering quarters for all courses listed below.

- **AUTONOMOUS SYSTEMS AND DATA SCIENCE (ASDS):** (Coordinator: Dr. Rowe)
  
  Students must take the following ASDS Core Sequence:
  - CS4330 Intro to Computer Vision (3-2) (Sp) (College-level programming)
  - MV4025 Cognitive and Behavioral Models for Simulations (3-2) (S) (CS3310)
  - CY3650 Cyber Data Management and Analytics (4-0) (AR) (CY3520, CS3502 or IS3502)

  In addition, students must choose three (3) of the following ASDS electives (or other course in ASDS by approval of Advisor or ASDS Manager):
  - CS4313 Advanced Robotic Systems (3-2) (W) (CS3310)
  - CS4317 Language Systems (3-2) (AR)
  - CS4558 Network Traffic Analysis (3-2) (F/Sp) (CS3502 and CS4550)
  - CS4677 Computer Forensics (3-2) (F/Sp) (CS3600)
  - CS492x Seminar on Advanced Autonomous Systems Topics (4-1)
  - MV4655/OA4655 Introduction to Joint Combat Modeling (4-0) (F/SP) (programming and statistics)
  - OA3304 Decision Theory (4-0) (AR)
  - OA4106 Advanced Data Analysis (3-1) (F/Sp) (OA3103)
  - OA4108 Data Mining (2-2) (OA3103, OA4106) (Sp)
  - OA4118 Statistical and Machine Learning (3-0) (W) (OA4106)

- **CYBER OPERATIONS (CO):** (Coordinator: Dr. Irvine)
  
  Students must take the following CO Core Sequence:
  - CS3690 Network Security (4-1) (W/S) (CS3600 & CS3502 or IS3502 or EC3710))
  - CS4679 Advances in Cyber Security Operations (4-1) (AR)
  - CY4700 Applied Defensive Cyber Operations (3-3) (W/S) (CY3000 & CS3690)
  - CY4710 Adversarial Cyber Operations (3-3) (F/Sp) ((CY3000 & CS3690; or consent of instructor

  In addition, students must choose two (2) of the following CO electives:
  - CS4558 Network Traffic Analysis (3-2) (F, Sp) (CS3502)
  - 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)
• **CYBER SECURITY & DEFENSE (CSD):** (Coordinator: Dr. Irvine)

  Students must take the following CSD Core Sequence:
  ___ CS3670 Secure Management of Systems (3-2) (F/Sp) (CS3600)
  ___ CS3690 Network Security (4-1) (W/S) (CS3600 & CS3502 (or IS3502 or EC3710))
  ___ CS4600 Secure Computer Systems (3-2) (F/Sp)
  ___ CY4700 Applied Defensive Cyber Operations (3-3) (W/S) (CY3000 & CS3690)

  In addition, students must choose two (2) of the following CSD electives:
  ___ CS4558 Network Traffic Analysis (3-2) (F, Sp) (CS3502)
  ___ CS4615 Formal Analysis of Cryptographic Protocols (3-1) (AR) (CS3600)
  ___ CS4650 Fundamentals of Information System Security Engineering (3-1) (AR) (CS4600)
  ___ CS4680 Introduction to Certification and Accreditation (3-2) (AR) (CS3670 or consent)
  ___ CS4684 Cyber Security Incident Response & Recovery (3-2) (F/W/S) (CS3690 or consent of instructor)
  ___ CS4690 Security for Cyber Physical Systems (3-1) (AR) (CS3690, CS3070, CS3140)

• **MOVES Option:** (Coordinator: Dr. C. Darken)

  Students interested in a CS degree with a focus on modeling, virtual environments and simulation may choose the MOVES Option as their Specialization.

  Students will work with their Advisor(s) to create a six (6) course sequence applicable to this specialization area. Their course plan must be listed below, and approved by their Thesis Advisor or MOVES Specialization Manager (para 7 below).

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

  Students must take the following N&M Core Sequence:
  ___ CS4533 Wireless Mobile Computing (3-2) (AR) (CS2020)
  ___ CS4535 Mobile Devices (3-2) (AR) (CS2020)
  ___ CS4537 Wireless Data Services (3-2) (AR) (CS4533 & CS4535)
  ___ CS4552 Network Design & Programming (3-3) (S) (Advanced programming, CS3502 or equivalent)
  ___ CS4554 Network Modeling & Analysis (4-0) (Sp) (CS3502)
  ___ CS4538 Mobile Device and Wireless Security (3-2) (AR) ((CS3600, CS3690, CS4537) or CS4558 Network Traffic Analysis (3-2) (F/S) (CS3502)
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• SOFTWARE ENGINEERING (SwE): (AR)

  (Coordinator: Dr. Luqi)

  Students must take the following SwE Core Sequence:
  ___SW4520 Advanced Software Engineering (3-0)
  ___SW4530 Software Engineering R&D in DoD (3-1)

  In addition, students must choose four (4) of the following SwE electives:
  ___SW4510 Computer-Aided Prototyping (3-0)
  ___CS4313 Advanced Robotic Systems (3-2)
  ___CS4330 Introduction to Computer Vision (3-2)
  ___CS4678 Advanced Cyber Vulnerability Assessment (4-2)
  ___CS4xxx Automatic Programming I (4-2)*
  ___CS4xxx Automatic Programming II (4-2)*
  ___MV4025 Cognitive and Behavioral Modeling for Simulations (3-2)
  ___OS4118 Statistical and Machine Learning (3-0)
  ___CC4101 System Engineering for Joint C4I Systems (4-2)
  ___CY3650 Cyber Data Management and Analytics (4-0)
  ___SS3613 Military Satellite Communications (3-0)
  ___AE4860 Military Space Maneuvers (2-2)

  * Future Projection.

4. Additional Military Requirements:

  All U.S. Navy Line Officer students (except Engineering Duty Officers) take JPME
  Phase 1:
  ___NW3230 Strategy & Policy (4-2)
  ___NW3275 Joint Maritime Operations Part 1 (4-0)
  ___NW3276 Joint Maritime Operations Part 2 (2-2)
  ___NW3285 National Security Decision Making (4-0)

  All U.S. Marine Corps students
  ___MN3331 Principles of System Acquisition & Program Management (5-1)

  May be dropped with concurrence of the Senior Marine Office.

  International Military students (as required by the International Office)
  ___IT1500 Informational Program Seminar for International Officers (4-0)
  ___IT1600 Communication Skills for International Officers (3-0)
  ___IT1700 Academic Writing for International Officers (2-0)
5. **Credit Hour Requirements:**
   - ___40 graduate credit hours at 3000-4000 level, with at least 12 of those hours at 4000 level.
   - ___28 of the 40 graduate credit hours must be in CS, MOVES, SW courses.
   **No more than 4 total sections of CS0810 may be taken, and no more than 2 sections may be taken during a given quarter.**

6. **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 (must be approved by Advisor or Specialization Manager). In addition, I have listed my one (1) required **Breadth Elective**, a 3000 or 4000-level general elective consisting of any course not in the core nor taken for a specialization.

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   Signature: ___________________________ Date: ______________

7. **Advisor or Specialization Manager approval:** Specialization courses above are approved.

   Signature: ___________________________ Date: ______________

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

   Signature: ___________________________ Date: ______________