***Department of Electrical and Computer Engineering***

 ***Checklist for combined MSEE & Electrical Engineer’s Degrees***

 The program leading to the Master of Science in Electrical Engineering at NPS is accredited at the advanced level through the Accreditation Board of Engineering and Technology. This accreditation is based on degree requirements set forth by the Electrical and Computer Engineering Department at NPS and approved by the NPS Academic Council. This checklist is provided to document the completion of these MSEE degree requirements. This checklist is also used to document completion of the Electrical Engineer Degree requirements.

**Student name:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; **email:**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Month/year enrolled:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; **Graduation date:**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Month/Year accepted in the Electrical Engineer’s Degree Program: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*(Attach copy of signed application at the back)*

**I certify that 1) the information contained on this form is correct; and 2) courses included in this checklist are not included in the requirements towards another Master degree in addition to the combined MSEE and Electrical Engineer’s Degrees.**

**Student :**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; **Date:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

***-- USN Students only (For P-codes issues)--***

***Final Checklist: Please attach Copy of Thesis Title & Abstract at the back***

**We certify that this student has met the minimum requirements for the MSEE and EE degrees.**

**Signatures:**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Academic Associate, Date ECE Assoc. Chair for Students, Date**

**ECE Department**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Program Officer, Date** **ECE Department Chair, Date**

**1. BSEE Degree/Equivalence** requirement satisfied by (fill in one):

* BSEE degree from: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Month/year:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* BSEE equivalence from NPS. Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**2. Thesis:**

* Number of thesis credits (16 minimum): \_\_\_\_\_\_\_\_\_\_\_\_\_
* Advisor: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Presentation date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Where? (ECE Seminar?)\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Completed EC3000 during (specify quarter ) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**The remaining requirements must be met exclusive of thesis requirements.**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**3. Program of Study:**

(Select **exactly two specialties contained within one focus area,** and check courses taken in those specialties):

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Focus Areas**🡪**Specialties** ↓ | **Communications &** **Information Engineering** | **Cyber Engineering**(For USN students selecting this focus area: “Cyber” is required as one of the two specialties  | **Nano-electronics** **&** **Energy Engineering** | **Sensor** **&** **Control Engineering** |
| Communications | √ | √ |   |   |
| Computers | √ | √ | √ |   |
| Cyber |   | √ |   | √ |
| Electronics | √ |   | √ |  |
| Guidance & Control |   |   | √ | √ |
| Networks | √ | √ |  |  |
| Power |   |   | √ | √ |
| Sensors | √ |  |  | √ |
| Signal Processing | √ | √ |   | √ |

*Focus Area selected: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*Specialties selected: (1) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ & (2) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

***USN students only: Final Checklist - Please attach Copy of Thesis Title & Abstract at the back***

|  |
| --- |
| ***For administrative use only – Subspecialty Code Assignment for US NAVY only*** |
| *Program Officer 🡪 Check Selected Code* |
| **🞏** *5302 – Communication Systems* | **🞏** *5308 – Total Ship Systems* |
| **🞏** *5304 – Guidance, Control & Navigation Systems* | **🞏** *5309 – Computer Systems* |
| **🞏** *5305 – Power Systems* | **🞏** *5310 – Sensor Systems Engineering* |
| **🞏** *5306 – Digital Signal Processing* | **🞏** *5311 – EE Energy Focus (curric 593)* |
| **🞏** *5307 – Electronics* | **🞏** *5312 – Networks* |
|  | **🞏** *5313 - Cyber* |

 ***List of Specialties (each specialty has 4 required courses)***

***Communications Systems:***

# **Required Courses:**

|  |  |  |  |
| --- | --- | --- | --- |
|  | EC 3500 | Analysis of Random Signals | (4-0) |
|  | EC 3510 | Communications Engineering | (3-2) |
|  | EC 4550 | Digital Communications | (4-0) |
|  | EC 4580 | Error Correction Coding  | (4-0) |

***Computer Systems:***

**Required Courses:**

|  |  |  |  |
| --- | --- | --- | --- |
|  | EC 3800 | Microprocessor Based System Design | (3-2) |
|  | EC 3840 | Introduction to Computer Architecture | (3-2) |
|  | EC 4820 | Advanced Computer Architecture | (3-2) |
|  | EC 4830 | Digital Computer Design | (3-2) |

***Cyber Systems:***

**Required Courses:**

|  |  |  |  |
| --- | --- | --- | --- |
|  | EC3730 | Cyber Network & Physical Infrastructures | (3-2) |
|  | EC3740 | Reverse Engineering in Electronic Syst. | (3-2) |

AND select *either* the Classified or Unclassified set:

**Classified:** (US only, with appropriate security clearance)

|  |  |  |  |
| --- | --- | --- | --- |
|  | [EC 3760](http://www.nps.edu/Academics/Schools/GSEAS/Departments/ECE/Handbook/CourseList/ec_courses.html) | Information Operations Systems | (3-2) |
|  | EC 4765 | Cyber Warfare | (3-2) |

 **OR**

 **Unclassified:**

|  |  |  |  |
| --- | --- | --- | --- |
|  | EC 4730 | Covert Communications  | (3-2) |
|  | EC 4770 | Wireless Communications Network Security | (3-2) |

***Guidance, Control & Navigation Systems:***

**Required Courses:**

|  |  |  |  |
| --- | --- | --- | --- |
|  | EC 3310 | Optimal Estimation: Sensor & Data Association | (3-2) |
|  | EC 3320 | Optimal Control Systems | (3-2) |
|  | EC 4310 | Fundamentals of Robotics | (3-2) |
|  | EC 4350 | Nonlinear Control Systems | (3-2) |

***Network Engineering:***

# **Required Courses:**

|  |  |  |  |
| --- | --- | --- | --- |
|  | EC 3710 orCS3502 | Computer Communications MethodsComputer Communications and Networks | (3-2)(4-2) |
|  | EC 4725 | Adv. Telecommunication Systems Eng.  | (3-2) |
|  | EC 4745 | Mobile Ad Hoc Wireless Networking | (3-2) |
|  | EC 4785 | Internet Engineering | (3-2) |

***Power Systems:***

**Required courses:**

|  |  |  |  |
| --- | --- | --- | --- |
|  | EC 3130 | Electrical Machinery Theory | (4-2) |
|  | EC 3150 | Power Electronics | (3-2) |
|  | EC 4130 | Advanced Electrical Machinery Systems | (4-2) |
|  | EC 4150 | Advanced Power Electronics | (3-2) |

***Electronics:***

**Required courses:**

|  |  |  |  |
| --- | --- | --- | --- |
|  | EC 3200 | Advanced Electronics Engineering | (3-2) |
|  | EC 3220 | Semiconductor Device Technologies | (3-2) |
|  | EC 4220 | Introduction to Analog VLSI | (3-1) |
|  | EC 4230 | Reliability Issues for Military Electronics | (3-1) |

***Signal Processing Systems:***

**Required Courses:**

|  |  |  |  |
| --- | --- | --- | --- |
|  | EC 3400 | Digital Signal Processing | (3-2) |
|  | EC 3410 | Discrete-Time Random Signals | (3-2) |
|  | EC 4440 | Statistical Digital Signal Processing  | (3-2) |
|  | EC 4480 | Image Processing and Recognition | (3-2) |

***Sensor, Radar and EW Engineering:***

**Required Courses:**

|  |  |  |  |
| --- | --- | --- | --- |
|  | EC 3600 | Antennas & Propagation | (3-2) |
|  | EC 3615 | Radar Fundamentals | (3-2) |
|  | EC 4630OrEC4615 | RCS Prediction & Reduction (until fy21)Advanced Radar (starting fy22) | (3-2)(3-2) |
|  | EC4685 | Principles of Electronic Warfare | (3-2) |

**List of ECE Electives not included above**

**Communications Systems**

|  |  |  |  |
| --- | --- | --- | --- |
|  | EC 4500 | Adv. Topics in Communications | (3-0) |
|  | EC 4510 | Cellular Communications | (3-0) |
|  | EC 4530 | Soft Radios  | (3-2) |
|  | EC 4560 | Spread Spectrum Communications | (3-2) |
|  | EC 4570 | Signal Detection and Estimation | (4-0) |
|  | EC 4590 | Communications Satellite Systems Eng. | (3-0) |

**Computer Systems**

|  |  |  |  |
| --- | --- | --- | --- |
|  | EC 3800 | Microprocessor Based System Design | (3-2) |
|  | EC 3820 | Computer Systems | (3-2) |
|  | EC 4800 | Adv. Topics in Computer Eng.  | (3-1) |
|  | EC 4830 | Digital Computer Design | (3-2) |
|  | EC 4870 | VLSI Systems Design | (3-2) |

**Electronics Systems**

|  |  |  |  |
| --- | --- | --- | --- |
|  | EC 3230 | Space Power & Radiation Effects  | (3-1) |
|  | EC 3240 | Renewable Energy at Military Bases | (3-2) |
|  | EC 3280 | Intro to MEMS Design Advanced  | (3-3) |
|  | EC 4950 | Emerging Nanotechnology  | (3-1) |
|  | EC 4280 | MEMS Design II | (2-4) |

**Guidance & Control Systems**

|  |  |  |  |
| --- | --- | --- | --- |
|  | EC4300 | Adv. Topics in Modern Control Systems  | (3-1) |
|  | EC 4330 | Navigation, Missile, & Avionics Systems | (3-2) |
|  | EC 4320 | Design of Robust Control Systems | (3-2) |

**Machine Power Systems**

|  |  |  |  |
| --- | --- | --- | --- |
|  | EC 3110 | Electrical Energy | (3-2) |

**Sensor Systems**

|  |  |  |  |
| --- | --- | --- | --- |
|  | EC 3210 | Intro to Electro-Optics Systems Eng. | (4-1) |
|  | EC 3610 | Microwave Engineering | (3-2) |
|  | EC 4210 | Electro-Optics Systems Engineering  | (3-0) |
|  | EC 4640 | Airborne Radar Systems  | (3-2) |

**Signal Processing Systems**

|  |  |  |  |
| --- | --- | --- | --- |
|  | EC 3460 | Machine Learning for Signal Analytics | (3-2) |
|  | EC 4400 | Adv. Topics in Signal Processing | (3-0) |
|  | EC 4450 | Sonar Systems Engineering | (4-1) |
|  | EC 4910 | DSP for Wireless Communications | (3-2) |

**Network Engineering**

|  |  |  |  |
| --- | --- | --- | --- |
|  | EC 4430 | Multimedia Info. & Communications  | (3-1) |
|  | EC 4710 | High-Speed Networking | (3-2) |

**Cyber Systems**

|  |  |  |  |
| --- | --- | --- | --- |
|  | [EC 3750](http://www.nps.edu/Academics/Schools/GSEAS/Departments/ECE/Handbook/CourseList/ec_courses.html)  | SIGINT Systems I (C) | (3-2) |
|  | EC 4715 | Cyber System Vulnerabilities & Risk Assessment  | (3-2) |
|  | EC 4747 | Data Mining in Cyber Applications | (3-2) |
|  | EC 4755 | Network Traffic, Activity Detection, & Tracking  | (3-2) |

 (C) : classified course

**=================================================================**

1. **At least 3 graded credit in a graduate course in mathematics:**

MA\_\_\_\_\_\_\_\_\_\_\_ Number of credits: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Selected Mathematics Courses* (all others require approval of the Academic Associate)

|  |  |  |  |
| --- | --- | --- | --- |
|  | MA 3030 | Introduction to Combinatorics and its Applications | (4-1) |
|  | MA 3042 | Linear Algebra | (4-0) |
|  | MA 3046 | Matrix Analysis | (4-1) |
|  | MA 3132 | Partial Differential Equations and Integral Transforms | (4-0) |
|  | MA 3232 | Numerical Analysis | (4-1) |
|  | MA 3677 | Theory of Functions of a Complex Variable I | (4-0) |

**5.** **Course credit requirements**

List all graduate courses taken in approved engineering, mathematics, physical science, and/or computer science.

1) EC3000 must be part of the program matrix but **do not** include EC3000 in the list below;

2) Lab credits count as half credits;

3) No selected specialization courses may be taken Pass/Fail (P/F). Only one instance of independent/special study course (graded P/F) may be counted towards meeting minimum degree requirements;

4) Do not include any graduate courses already counted for the BSEE equivalence in the Table below;

5) After entry in the program, students must maintain an average GQPR of 3.5 through the last quarter.

**Final quarter GQPR:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Note:** course credit numbers are periodically re-evaluated and may have changed since you took a course. *Only the credits shown on your student transcripts will be counted to satisfy minimum requirements.*

|  |  |  |  |
| --- | --- | --- | --- |
| **3000-level courses** | **Credits (X-X)** | **4000-level courses** | **Credits (X-X)** |
| **Selected Required Specialty Courses** |
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| **Electives** |
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| --- |
| **Graduate courses counted towards the BSEE equivalence** **( Maximum of 4 allowed after approval by AA):** |
| 1) | 2) | 3) | 4) |

 (a) Total graduate credits in approved engineering, mathematics,
 physical science, and/or computer science:
 (72 minimum at 3xxx and 4xxx-level): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 (b) Total credits from (a) in ECE1 3xxx and 4xxx courses: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 (54 graded credits minimum)

 (c) Total credits from (a) at 4000 level: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 (36 minimum, which must be graded)

*Note: 1. Up to 6 credits from graded, graduate-level courses in other engineering and physical science departments can be substituted for ECE courses with the* ***advanced approval*** *of the ECE Academic Associate and Chairperson.*