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

***Checklist for MSES(EE) Degree***

This checklist is provided to document the completion of the MSES(EE) degree requirements.

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

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

**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.**

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

**We certify that this student has met the minimum requirements for the MSES(EE) degree.**

**Signatures:**

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

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

**ECE Department**

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

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

**1. Undergraduate Institution(s):**

List undergraduate institution(s), degree(s) and dates:

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**2. Thesis:**

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

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

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**3. Program of Study:**

(Select **one specialty: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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

***Recall: you must request enrollment in a certificate if you wish to get nominated for it*** *(see EC0000 SOP for details)*

***Communications Systems:***

# **Required Courses: (satisfies 287 certificate)**

|  |  |  |  |
| --- | --- | --- | --- |
|  | 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: (satisfies 286 certificate)**

|  |  |  |  |
| --- | --- | --- | --- |
|  | 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: (may satisfy 288 or 296 certificate)**

|  |  |  |  |
| --- | --- | --- | --- |
|  | 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: (satisfies 284 certificate)**

|  |  |  |  |
| --- | --- | --- | --- |
|  | EC 3310 | Optimal Estimation: Sensor & Data Association | (3-2) |
|  | EC 3320 | Optimal Control Systems | (3-2) |
|  | EC 4330 | Navigation, Missile, & Avionics Systems | (3-2) |
|  | EC 4350 | Nonlinear Control Systems | (3-2) |

***Network Engineering:***

# **Required Courses (satisfies 295 certificate)**

|  |  |  |  |
| --- | --- | --- | --- |
|  | EC 3710  Or  CS3502 | Computer Communications Methods  Computer 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 3795 | Mobile Telecommunications Fundamentals | (3-2) |

***Power Systems:***

**Required courses: (satisfies 291 certificate)**

|  |  |  |  |
| --- | --- | --- | --- |
|  | EC 3130 | Electrical Machinery Theory | (3-3) |
|  | EC 3150 | Power Electronics | (3-2) |
|  | EC 4130 | Advanced Electrical Machinery Systems | (3-3) |
|  | 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 | (3-2) |
|  | EC 4230 | Reliability Issues for Military Electronics | (3-2) |

***Signal Processing Systems:***

**Required Courses: (satisfies 290 certificate)**

|  |  |  |  |
| --- | --- | --- | --- |
|  | EC 3400 | Digital Signal Processing | (3-2) |
|  | EC 3410 | Discrete-Time Random Signals | (3-2) |
|  | EC 4440 | Statistical Digital Signal Processing | (3-2) |
|  | EC4450  Or  EC 4480 | Array Signal Processing Engineering  Image Processing and Recognition | (3-2) |

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

**Required Courses: (satisfies 292 certificate)**

|  |  |  |  |
| --- | --- | --- | --- |
|  | EC 3600 | Antennas & Propagation | (3-2) |
|  | EC 3615 | Radar Fundamentals | (3-2) |
|  | EC 4630  Or  EC4615 | RCS Prediction & Reduction (until fy21)  Advanced Radar (starting fy22) | (3-2)  (3-2) |
|  | EC4685 | Principles of Electronic Warfare | (3-2) |

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

**List of ECE courses 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**

|  |  |  |  |
| --- | --- | --- | --- |
|  | EC 4300 | Adv. Topics in Modern Control Systems | (3-1) |
|  | EC 4310 | Fundamentals of Robotics | (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 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

3. **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) Only one instance of EC4900 may be counted towards meeting minimum degree requirements.

**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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| --- | --- | --- |
| (a) | Total graduate credits of graduate level course work in approved engineering, mathematics, physical science, and/or computer science.  (**36 minimum at 3xxx and 4xxx-level**) |  |
| (b) | Total credits from (a) in ECE 3xxx and 4xxx courses.  (**20 graded credits minimum**) |  |
| (c) | Total credits from (a) at 4000 level.  (**12 graded credits minimum**) |  |