

***Department of Electrical and Computer Engineering  
Checklist for 591 Space Engineering Focus Area  
MSEE Degree  
(Available to Space Engineering students only)***

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 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 MSEE degree.**

**Signatures:**

\_\_\_\_\_  
**Academic Associate, Date  
ECE Department**

\_\_\_\_\_  
**ECE Assoc. Chair for Students, Date**

\_\_\_\_\_  
**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?) \_\_\_\_\_
- EC3000 - Not Required of 591 students

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

**3. Program of Study:**

(591 students – Select **exactly two Space-ECE specialties contained within the Space focus area**, and check courses taken in those specialties):

Specialties	Focus Area: Space Systems Available only to non-590 students
Communications	√
Computers	√
Cyber	√
Electronics	√
Guidance & Control	
Networks	√
Power	√
Sensors	√
Signal Processing	√

*MSEE Specialties selected:*  
(Communications recommended)

(1) \_\_\_\_\_

(2) \_\_\_\_\_

*Focus Area selected:*

Space

## For 591 students only

### Space Focus satisfied by the following courses in 591 Matrix

#### Required Core Space Courses:

	SS3001	Military Applications of Space	(3-2)
	SS3500	Orbital Mechanics	(3-2)
	AE3851	Spacecraft Propulsion	(3-2)
	AE4870	Spacecraft Design and Integration I	(4-0)
	AE4871	Spacecraft Design and Integration II	(2-4)
	MA3046	Matrix Analysis	(4-1)
	EC3230	Space Power and Radiation Effects	(3-1)

### List of MSEE Specialties (select two specialty areas)

#### Space Communications Systems:

##### Required Courses:

	EC 3500	Analysis of Random Signals (Fa)	(4-0)
	EC 3510	Communications Engineering (Wi)	(3-2)

##### Select one of:

	EC 4550	Digital Communications (Sp)	(4-0)
	EC 4580	Error Correction Coding (Su)	(4-0)

(This specialty satisfies the EO2525 and EO3525 591 P-code requirement)

#### Computer Systems:

##### Select two of:

	EC 3800	Microprocessor Based System Design	(3-2)
	EC 3820	Computer Systems	(3-2)
	EC 3830	Digital Computer Design Methodology	(3-2)
	EC 3840	Introduction to Computer Architecture	(3-2)

##### Select one of:

	EC 4810	Fault Tolerant Computing	(3-2)
	EC 4820	Advanced Computer Architecture	(3-2)
	EC 4830	Digital Computer Design	(3-1)
	EC 4870	VLSI Systems Design	(3-2)

#### Cyber Systems:

##### Required Course

	EC 3730	Cyber Netwk. & Phys. Infrastructures (Fa and Sp)	(3-2)
--	---------	--	-------

##### Select two of the Warfare Subspecialty:

	EC 3750	SIGINT Systems I <sup>(C)</sup>	(3-2)
	EC 3760	Information Operations Systems <sup>(C)</sup> (W)	(3-2)
	EC 4765	Cyber Warfare <sup>(C)</sup> (Sp) – requires EC3760	(3-2)
	EC 4730	Covert Communications (Fa)	(3-2)

	EC 4715	Cyber System Vulnerabilities & Risk Assessment (Su)	(3-2)
--	---------	---	-------

<sup>(c)</sup> : classified course

#### Space Power Systems:

##### Required courses:

	EC 3150	Solid State Power Conversion (Su)	(3-2)
	EC 3230	Space Power and Radiation Effects (Fa)	(3-1)
	EC 4150	Advanced Solid State Power Conv. (Fa)	(4-1)

#### Electronics:

##### Required courses:

	EC 3200	Advanced Electronics Engineering (W)	(3-2)
	EC 3220	Semiconductor Device Technologies (Fa)	(3-2)

##### Select one of:

	EC 4220	Introduction to Analog VLSI (Su)	(3-1)
	EC 4230	Reliability Issues for Military Electr. (Wi)	(3-1)
	EC 4950	Emerging Nanotechnology	(3-1)

#### Signal Processing Systems:

##### Required Courses:

	EC 3400	Digital Signal Processing (Fa)	(3-1)
	EC 3410	Discrete-Time Random Signals (Su)	(3-2)

##### Select one of:

	EC 4440	Statistical Digital Signal Processing (Fa)	(3-2)
	EC 4480	Image Processing and Recognition (Wi)	(3-2)



## Network Engineering:

### Required Courses:

EC 3710	Computer Communications Methods (Fa)	(3-2)
EC 4745	Mobile Ad Hoc Wireless Networking (Sp)	(3-2)

### Select one of:

EC 3760	Information Operations Systems <sup>(C)</sup> (W)	(3-2)
EC 4710	High-Speed Networking (Su)	(3-2)
EC 4725	Adv. Telecommunication Systems Eng. (Su)	(3-2)
EC 4785	Internet Engineering (Wi)	(3-2)

<sup>(C)</sup> : classified course

## Space Sensor Systems Engineering:

This specialty is completed by completing one of the following two subspecialties:

### Radio Frequency Sensors Subspecialty

### Required:

EC 3600	Antennas & Propagation (Wi)	(3-2)
---------	-----------------------------	-------

### Select one of:

EC 3610	Microwave Engineering	(3-2)
EC 3630	Radiowave Propagation (Sp)	(3-2)

### Select one of:

EC 4610	Radar Systems (Su)	(3-2)
EC 4630	RCS Prediction & Reduction (Fa)	(3-2)
EC 4640	Airborne Radar Systems	(3-2)

## Sensor Attack and Protection Subspecialty

### Required:

EC 3600	Antennas & Propagation (Wi)	(3-2)
EC 3700	Joint Network-Enabled Electronic Warfare I (Fa)	(3-2)

### Select one of:

EC 3610	Microwave Engineering	(3-2)
EC 3630	Radiowave Propagation (Sp)	(3-2)

## List of ECE and Math 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 4800	Adv. Topics in Computer Eng.	(3-1)
---------	------------------------------	-------

### Electronics Systems

EC 3230	Space Power & Radiation Effects	(3-1)
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)
---------	---------------------------------------	-------

### Sensor Systems

EC 4210	Electro-Optics Systems Engineering	(3-0)
---------	------------------------------------	-------

### Signal Processing Systems

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

### Systems Engineering

EC 4010	Principles of Systems Eng.	(3-2)
---------	----------------------------	-------

### 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)

### 3. Course credit requirements

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

- 1) Lab credits count as half credits;
- 2) Only one instance of EC4900 may be counted towards meeting minimum degree requirements;
- 3) Do not include any graduate courses already counted for the BSEE equivalence in the Table below.

**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)
<b>Selected Required Courses</b>			
SS3500	(4-0)	AE4870	(4-0)
MA3046	(4-1)	AE4871	(2-4)
AE3851	(3-2)	EC4___ from Specialty	( ) [At least (3-1)]
SS3001	(3-2)	EC4___ from Specialty	( ) [At least (3-0)]
EC3230	(3-1)		
EC3___ from Specialty	( ) [At least (3-0)]		
EC3___ from Specialty	( ) [At least (3-0)]		
EC3___ from Specialty	( ) [At least (3-0)]		
<b>Electives</b>			
Subtotal EC			
Subtotal Science/Engr			

<b>Graduate courses counted towards the BSEE equivalence ( Maximum of 4 allowed after approval by AA):</b>			
1)	2)	3)	4)

- (a) Total graduate credits in approved engineering, mathematics, physical science, and/or computer science (36 minimum at 3xxx and 4xxx-level): \_\_\_\_\_
- (b) Total credits from (a) in ECE<sup>1</sup> 3xxx and 4xxx courses: (24 graded credits EC + 6 graded credits MAE minimum) \_\_\_\_\_
- (c) Total credits from (a) at 4000 level: (12 credits minimum and 4 courses 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 by 591 students.*