

2014-2016 EDUCATION SKILLS REQUIREMENTS  
ELECTRICAL SYSTEMS AND ENGINEERING  
53XXP  
590/593

1. Curriculum Number: 590/593
2. Curriculum taught at NPS
3. Students are fully Funded
4. Curriculum Length in Months: 24
5. Months the program starts: Jan, Mar, Jun, Sep
6. APC Required 323
7. Community Managers have agreed to allow billets to be coded for 590/593 and Officers to be educated for these curricula.

**ESR 1: Mathematics:** The officer will have a thorough knowledge of mathematical tools, which are intrinsic to electrical and computer systems engineering, including but not limited to differential equations, vector analysis, linear algebra, probability, and Fourier and Laplace methods.

**ESR 2: Engineering Science and Design:** To acquire the requisite background needed to meet the other military education requirements, the officer will acquire proficiency in modern physics, electromagnetics, electronic devices and circuits, system theory, modern electronic system design, and integrated electrical power systems and their controls. In addition, proficiency will be gained in other appropriate fields, such as underwater acoustics, dynamics, fluid mechanics, thermodynamics, or energy science and technology that provide the requisite breadth to a military engineering education.

**ESR 3: Electronic and Electrical Engineering:** In order to provide officers skilled in the application of electronic systems to military needs, the officer will have competence in the broad area of electrical engineering including circuits, electronics, computer and communications networks, and systems engineering. To achieve depth and breadth of understanding, the officer shall specialize in a minimum of two from the following areas: (a) Electronics - Including semiconductor nanotechnology for defense-related

electronic technologies; reliability and radiation hardening for electronic military systems; solar cell photovoltaic components; engineering techniques for analog IC design, modeling and simulation (b) Communication Systems - including radio communications, modulation, forward error correction coding, electronic countermeasures, software defined radio, and other military issues (c) Guidance, Control & Navigation Systems - including robotics, unmanned systems, avionics systems, target tracking, sensors as applied to guidance and control, and data association (d) Power/Energy Systems - including shipboard electric machinery, converters for advanced shipboard electric power and the simulation and analysis of power electronic drives, or alternative energy generation and utilization, and energy conservation and storage (e) Signal Processing Systems - including signal analytics for efficient extraction, representation, and identification of information as applied to surveillance, signals intelligence, RF and underwater data acquisition and processing, imaging and other defense-related issues (f) Cyber Systems - including a rigorous treatment of the cyber infrastructure, reverse engineering of cyber systems, cyber systems vulnerabilities and risk assessment, cyber warfare systems, telecommunications systems engineering, and Internet engineering (g) Computer Systems - including logic design, FPGA and ASIC design, computer architecture and the hardware/software interface, parallel and distributed computing, embedded and real-time computing, high-reliability and reconfigurable computing, computer systems modeling, simulation, and analysis (h) Sensor Systems Engineering - including radar, sonar, RF and microwave devices, infrared and electro-optical imaging and tracking, antennas and propagation, network-enabled electronic warfare, and spectrum management (i) Network Engineering - including wireless networks, sensor networks, high speed data networking, the Internet and telecommunication systems.

**ESR 4: Conducting and Reporting Independent Investigation:**  
The officer will demonstrate the ability to conduct independent investigation of a Navy and/or DOD relevant electronic systems problem, to resolve the problem, and to present the results of the analysis in both written and oral form.

APPROVED:

[REDACTED]  
Major Area Sponsor

3/30/15

[DATE]

MAY 27 2015

APPROVED:

[REDACTED]  
President, NPS

[DATE]

APPROVED:

[REDACTED]  
Director, TFM/ERD (OPNAV N12)

23 July 2015

[DATE]