

FY14-16 EDUCATIONAL SKILL REQUIREMENTS
Space Systems Operations
Subspecialty 6206
Curriculum 366

1. Curriculum Number: 366
2. Curriculum taught at Naval Postgraduate School
3. Students are Fully Funded or Partially Funded: Fully
4. Curriculum Length in Months: 18
5. APC Required: 334
6. Community Managers have agreed to allow billets to be coded for Space Systems Operations / 6206P and officers to be educated for this curriculum.

Designator	OCM Name	Approval Date
a. 1110	CDR Erik Eslich	Approved 28 AUG 2014
b. 1120	LCDR Alan Nelson	Approved 01 SEP 2014
c. 1300	CDR Patrick Hansen	Approved 15 SEP 2014
d. 1510	LCDR Mark Angelo	Approved 15 SEP 2014
e. 1800	LCDR Christi Montgomery	Approved 15 SEP 2014
f. 1810	LCDR Joel Yates	Approved 15 SEP 2014
g. 1820	CDR Ken Demick	Approved 05 SEP 2014
h. 1830	CDR James Scarcelli	Approved 12 SEP 2014

7. The officer must understand the fundamental concepts and be familiar with the basic functional areas of Space Systems Operations within the Department of the Navy (DON) and the Department of Defense (DOD) including the following numbered ESRs:

1. Orbital Mechanics and Space Environment:
 - a. Graduates will examine the basic physics of orbital motion, and calculate and distinguish the parameters used in the description of orbits and their ground tracks.

b. Graduates will examine the design of orbits and constellations, and analyze how they are achieved, maintained, and controlled; to include spacecraft maneuver and orbit transfer calculations.

c. Graduates will examine the fundamentals of spacecraft tracking and command/control from a ground station.

d. Graduates will analyze the relationship between various orbital characteristics and the satisfaction of mission requirements, including the advantages and disadvantages of various orbits.

e. Graduates examine the space environment impacts on spacecraft parts, materials, and operations to spacecraft and mission design.

2. Spacecraft Design:

a. Graduates will examine the basic system design of a spacecraft including its various subsystems: propulsion; structure; thermal; attitude determination and control; electrical power; and telemetry, tracking and commanding.

b. Graduates will assess key interactions between the various subsystems and their effects on system performance.

3. National Security Systems:

a. Graduates will examine the nature of space warfare (theory, history, doctrine, and policy); distinguish between the five JP 3-14 defined Space Mission Areas (Space Situational Awareness, Space Control, Space Support, Space Force Enhancement, and Space Force Application); and interpret how current and planned space capabilities contribute to the satisfaction of these mission areas.

b. Graduates will examine the roles, responsibilities, and relationships of National and DoD organizations in establishing policies, priorities, and requirements for National Security Space systems; and in the design, acquisition, operation, and exploitation of these systems.

c. Graduates will examine the role of the Services / Agencies in establishing required space system capabilities, and will translate these capabilities into system performance requirements.

d. Graduates will examine: current and planned Intelligence, Surveillance, and Reconnaissance (ISR) capabilities; how space systems contribute to these capabilities; the intelligence collection and analysis process; and how war-fighters access information from these sources.

4. Management / Acquisition:

a. Graduates will examine project management and DoD system acquisition methods and procedures to include contract

management, financial management and control, and the Planning, Programming, Budgeting and Execution system (PPBE).

b. Graduates will examine system acquisition organizational responsibilities and relationships (e.g., Congress, DoD, Services, Resource Sponsor, Systems Commands, Operating Forces) as they pertain to the acquisition of systems for DoD, Naval, and civilian agency users.

c. Graduates will examine the unique nature of space acquisition programs using the Space Systems Acquisition Policy process. Based on this knowledge, they will plan and structure a notional space system acquisition program.

d. Graduates will examine how proposed space-related capabilities and DOTMLPF requirements are translated from concept to real-world implementation.

e. Graduates will apply the tools of project management (e.g., scheduling, costing, budgeting, planning, resource negotiation, risk management) to a space project.

f. Graduates will prepare for and conduct program reviews, from systems requirements through critical design, during spacecraft and architecture design projects.

5. Communications:

a. Graduates will examine the basic principles of networks and communications systems operations and engineering to include both the space and ground segments.

b. Graduates will examine digital and analog communications architecture and networks design, including such topics as frequency reuse, multiple access, link design, repeater architecture, source encoding, waveforms/modulations, and propagation media.

c. Graduates will calculate and analyze link budgets to assess communication system suitability to support mission requirements, and to translate mission requirements into communications system design characteristics.

d. Graduates will differentiate, compare, and contrast the characteristics and capabilities of current and future space related networks and communications systems in use or planned by Naval operating and Joint forces afloat and ashore and understand the threats (both kinetic and non-kinetic) to these capabilities and associated countering or mitigation strategies.

e. Graduates will recognize the national and international issues involving use of the frequency spectrum and the relative priority and criticality of various segments of the frequency spectrum, and the space systems that employ them, to national defense.

f. Graduates will discuss the nature of the rapid evolution in commercial satellite communications systems, and

recognize the impact of such advancements on military operations and systems development.

6. Remote Sensing:

a. Graduates will examine principles of active and passive sensors in current or planned use.

b. Graduates will examine the effects of the space, atmospheric, and terrestrial environments (including countermeasures) on sensor performance.

c. Graduates will examine tradeoffs among various sensors and platforms, evaluating how each satisfies mission requirements such as access area, resolution, timeliness, and capacity.

7. Analysis and Evaluation:

a. Graduates will derive, assess, and articulate capabilities necessary for the use of National Security Space systems in support of military operations.

b. Graduates will examine various engineering and mathematical definitions of cost functions (revisit time, dwell time, local coverage, etc.)

c. Graduates will use business case (economic) and performance data to analyze trade-offs between commercial and DoD systems to provide desired operational capabilities.

8. Architecting Missions:

a. Graduates will examine and relate the principles of architecting a complex, Joint National Security Space mission, and the life cycle process by which a space system is conceived, structured, designed, built, tested, certified and operated in a way that ensures its integrity and performance.

b. Graduates will develop and assess system requirements; compose alternate architectures to satisfy those requirements; and evaluate and select the most effective alternative.

c. Graduates will develop system design criteria from stated performance requirements, and conduct trade-offs between payloads and other spacecraft subsystems.

d. Graduates will examine the design of current and planned space-based mission payloads (e.g., ISR, Communications, PNT, SIGINT).

e. Graduates will examine the basic principles and operational issues of space access to include launch vehicle performance, launch windows, and their impact on military operations.

9. Operational Mission Planning:

a. Graduates will examine the basic elements of mission operations - spacecraft commanding, payload management, anomaly

resolution, orbital maneuver planning - and will apply these concepts during satellite and architecture design projects.

b. Graduates will understand the role of space in the development of an OPLAN. Graduates will have the ability to assess a concept of operations that includes all five mission areas identified in JP 3-14. Graduates will demonstrate the ability to develop an acceptable command and control structure for space operations and the space annex of an OPLAN.

c. Graduates will develop space plans in support of OPLANS and/or OPOARDS to include staff estimates, ANNEX N inputs and command recommendations for Space Force Enhancements, limited Space Control, threat analysis and mitigation measures, and limiting factors culminating in a mission planning exercise.

d. Graduates will gain exposure to appropriate space planning and analysis tools and capabilities that exist within the DoD/Intel Communities and use them in execution of mission planning exercise.

10. Advanced Concepts and Technology:

a. Graduates will examine how current and future space systems contribute to National Security and will examine means to employ space-based capabilities to support information dominance.

b. Graduates will examine potential future military space requirements stemming from desired information dominance capabilities.

c. Graduates will examine future concepts of operation published by various DoD and international organizations (ESA, ISA, WSO, etc.) based on emerging technologies and appraise their impact on military space.

d. Graduates will examine the advanced concepts and technologies which could be used in future military space systems.

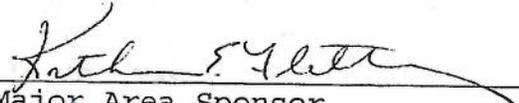
11. Research:

a. Graduates will conduct independent or group research on a space systems problem, including resolution of the problem and presentation of the results and analysis in both written and oral form.

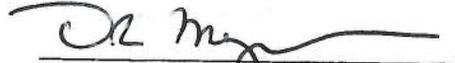
12. Joint Professional Military Education:

a. Graduates will develop a graduate-level ability to think strategically, critically analyze past military campaigns, and apply historical lessons to future joint and combined operations, in order to discern the relationship between a nation's policies and goals and the ways military power may be used to achieve them. This is fulfilled by completion of the

first of the Naval War College course series leading to Service Intermediate-level Professional Military Education (PME) and Phase I Joint PME credit.

APPROVED:  12-10-2014
Major Area Sponsor Date

APPROVED:  JAN 21 2015
President, NPS Date

APPROVED:  2 Jun 2015
Director, TEMTE (OPNAV N12) Date