

2019-21 EDUCATIONAL SKILL REQUIREMENTS  
Undersea Warfare  
6301  
Curriculum 525

1. Curriculum Number: 525
2. Curriculum taught at Naval Postgraduate School
3. Curriculum Length in Months: 24 months
4. APC Required: 323
5. The officer must understand the fundamental concepts and be familiar with the basic functional areas of Undersea Warfare (USW) within the Department of the Navy (DoN) and the DoD including:

**ESR-1: Mathematics:** The officer will master the mathematical principles and techniques necessary to complete graduate level course work and research related to undersea warfare.

**ESR-2: Physics:** The officer will understand physical principles applicable to acoustic, non-acoustic USW sensors and systems.

**ESR-3: Acoustics:** The officer will understand acoustical phenomena affecting the design, performance, and operation of acoustic USW sensors and systems.

**ESR-4: Oceanography:** The officer will understand atmospheric and oceanographic processes influencing the performance and tactical use of USW systems.

**ESR-5: Signal Processing:** The officer will understand fundamental principles of signal processing and machine learning as they apply to signal and information processing in USW systems.

**ESR-6: Operations Research:** The officer will understand the principles of USW search, detection, and localization, particularly in support of operational planning. The officer will understand principles of tactical decision aids and data analysis in the evaluation of USW systems.

**ESR-7: Unmanned Systems:** The officer will understand the fundamental technologies and capabilities of unmanned underwater systems and tactical robotics. This will include a physical understanding of autonomous vice remotely operated current and future technologies, such as artificial intelligence and machine learning, as well as concepts and limitations for unmanned systems as a part of future undersea operating concepts.

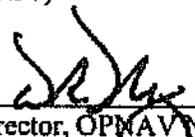
**ESR-8: Programming and Simulation:** The officer will be able to program solutions to essential engineering problems. The officer will be able to assess models and perform simulations.

**ESR-9: Problem Solving and Practical Applicability:** The officer will demonstrate the ability to conduct independent analysis in USW and proficiency in written and oral presentations. Additionally, they will understand the history of USW and its implications to today's Navy.

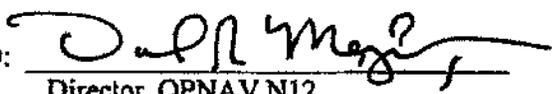
6. Major Area Sponsor and Subject Matter Experts

a. Major Area Sponsor: VADM William Merz, Deputy Chief of Naval Operations for Warfare Systems (OPNAV N9)

b. Subject Matter Expert: RADM John W. Tammen, Director, Undersea Warfare Division (OPNAV N97)

APPROVED:  6-11-18  
Director, OPNAV N9 [DATE]

APPROVED:  6-28-2019  
President, Naval Postgraduate School [DATE]

APPROVED:  16 July 2019  
Director, OPNAV N12 [DATE]