

CURRICULUM OUTLINE OF INSTRUCTION
SURFACE WARFARE OFFICER DEPARTMENT HEAD COURSE
CIN: A-4H-0107 **CDP: 9545**

MODULE 1-5: UNDERSEA WARFARE

Updated 10 Jan 12 - FINAL

Lesson/Topic	Learning Objectives
Phase I TO	TO 1-5-1-1 IDENTIFY the key elements of the ASW course syllabus. TO 1-5-1-2 IDENTIFY ASW threat platforms.
Topic 1-5-1-1, Lesson: Pre Intro and Documentation	EO 1-5-1-1.1 Pre ASW Introduction and handout of ASW documentation. To include: Curriculum Current schedule
Topic 1-5-1-2, Lesson: ASW Overview	EO 1-5-1-2.1 IDENTIFY the key elements of the ASW course syllabus, to include: Staff Instruction Expectations Grading Critique
Threat Brief	REVIEW ASW threats faced by the USN. <i>(ASW aspects of earlier threat brief.)</i>
Phase II TO	TO 1-5-2-1 DESCRIBE conceptual aspects of Anti-Submarine Warfare (ASW) to include the following: Sea Power 21 / Full Spectrum ASW ASW OPTASK and Warfare Missions Marine Mammal Mitigation ASW Command and Control WSM/PMI and Safety Tactical Use of the Environment Acoustic Analysis
Topic 1-5-2-1, Lesson: Sea Power 21 / Full Spectrum ASW	EO 1-5-2-1.1 DESCRIBE the ten threads of Full-spectrum ASW (FSASW), the level of command at which they are planned, and capabilities required for execution. EO 1-5-2-1.2 EXPLAIN your role in FSASW and how FSASW supports the combatant commander's warfighting objective.
Topic 1-5-2-2, Lesson: ASW Missions and the OPTASK ASW	EO 1-5-2-2.1 IDENTIFY and DESCRIBE current and enduring ASW missions. To include: Surveillance / Presence Transit Protection SLOCs (Defended Line) Protection Barrier Patrol / Bounded Sea Patrol Hunter Killer Break Out/In Peacetime Covert Tracking EO 1-5-2-2.2 Review the Navy wide OPTASK ASW, IDENTIFY and EXPLAIN key sections.
Topic 1-5-2-3, Lesson: Marine Mammal Mitigation	EO 1-5-2-3.1 DEMONSTRATE an understanding of the procedures and responsibilities for marine species protection.

UNCLASSIFIED

CURRICULUM OUTLINE OF INSTRUCTION
SURFACE WARFARE OFFICER DEPARTMENT HEAD COURSE
CIN: A-4H-0107 **CDP: 9545**

Topic 1-5-2-4, Lesson: Command and Control	EO 1-5-2-4.1 DEMONSTRATE an understanding of the ASW chain of command diagram from Ownship to Theater ASW Commander. EO 1-5-2-4.2 DESCRIBE communications through Submarine Operational Control Authority (SOCA) and Submarine Operating Authority (SUBOPUTH). EO 1-5-2-4.3 LIST and DESCRIBE the methods to communicate with an organic submarine. EO 1-5-2-4.4 DESCRIBE internal watch stander roles and responsibilities with respect to an ASW environment.
Topic 1-5-2-5, Lesson: WSM, PMI and Safety	EO 1-5-2-5.1 DESCRIBE and APPLY WSM principles to conduct an effective ASW war fight while minimizing the likelihood of fratricide. EO 1-5-2-5.2 DESCRIBE and APPLY Prevention of Mutual Interference (PMI) principles to conduct an effective ASW war fight while minimizing the likelihood of underwater collisions. EO 1-5-2-5.3 LIST and DESCRIBE safety signals and procedures used between surface units and submarines.
Topic 1-5-2-6, Lesson: Tactical Use of the Environment	EO 1-5-2-6.1 LIST and EXPLAIN the differences between acoustic and non-acoustic detection methods. EO 1-5-2-6.2 DRAW and DESCRIBE an acoustic ray path. EO 1-5-2-6.3 IDENTIFY the variables associated with the active and passive SONAR equations to include: Propagation Loss (PL), Source Level (SL), Signal Excess (SE), Recognition Differential (RD), Directivity Index (DI), Ambient Noise (AN), Self Noise (SN), Target Strength (TS), and Background Noise (LE). EO 1-5-2-6.4 EXPLAIN the tactical significance of the Active Figure of Merit equation (AFOM), Passive Figure of Merit equation (PFOM), Passive Sonar Equation, and Active Sonar Equation. EO 1-5-2-6.5 EXPLAIN the relationship between the Propagation Loss Curve, the Passive Figure of Merit line, and Probability of detection. EO 1-5-2-6.6 IDENTIFY and DESCRIBE the characteristics of sound propagation paths to include: direct path, surface duct, half-channel, sound channel, bottom bounce, and convergence zone. EO 1-5-2-6.7 DESCRIBE the effects of bottom topography. EO 1-5-2-6.8 IDENTIFY submarine tactics while operating in the littorals and in the vicinity of an eddy. EO 1-5-2-6.9 DESCRIBE the tactical employment/placement of friendly assets and sensors to counter a submarine operating in the vicinity of a front or eddy.

UNCLASSIFIED

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SURFACE WARFARE OFFICER DEPARTMENT HEAD COURSE
CIN: A-4H-0107 CDP: 9545**

<p>Topic 1-5-2-7, Lesson: Acoustic Analysis</p>	<p>EO 1-5-2-7.1 IDENTIFY common techniques and displays used to quickly determine general vessel type, to include: Submarine Surface warship Merchant vessel Trawler Torpedo</p> <p>EO 1-5-2-7.2 IDENTIFY common techniques and displays used to further classify surface and subsurface contacts by class and type.</p> <p>EO 1-5-2-7.3 IDENTIFY various acoustical dynamic events, to include: CPA Course changes Speed changes</p>
<p>Topic 1-5-2-8, Lesson: Tactical Decision Aids</p>	<p>EO 1-5-2-8.1 DESCRIBE systems utilized in ocean data collection to include: Expendable Bathythermograph (XBT) Littoral Battlespace Sensing Glider (LBS-G)</p> <p>EO 1-5-2-8.2 DESCRIBE fleet tactical decision aids to include: PC IMAT SIMAS SPPFS-STDA CADRT CATMAN</p> <p>EO 1-5-2-8.3 LIST the planning considerations and inputs necessary for range prediction using a sonar tactical decision aid.</p> <p>EO 1-5-2-8.4 LIST and DESCRIBE shore based resources available for ocean analysis.</p>
<p>Topic 1-5-2-9, Lesson: NMWAC USW Perspectives (NOFORN)(VL)</p>	<p>EO 1-5-2-9.1 EXPLAIN the possible global USW threats to the United States and her allies to include: Submarines Torpedoes Mines Tactics</p> <p>EO 1-5-2-9.2 STATE the function of the Naval Mine and ASW Command (NMWAC).</p> <p>EO 1-5-2-9.3 LIST and EXPLAIN the current USN's ASW Fleet Training Continuum to include: IAC S IAC I FST GC IAC II/C2X</p>

**CURRICULUM OUTLINE OF INSTRUCTION
SURFACE WARFARE OFFICER DEPARTMENT HEAD COURSE
CIN: A-4H-0107 CDP: 9545**

	<p align="center">JTFEX/FST J</p> <p>EO 1-5-2-9.4 EXPLAIN the USN's Proficiency and Readiness Review (PARR)</p> <p>EO 1-5-2-9.5 EXPLAIN the USN's ASW assessment</p>
PHASE III TO	TO 1-5-3-1 Be able to IDENTIFY external ASW communications circuits used in ASW missions and be FAMILURE with various ASW related voice reports.
Topic 1-5-3-1, Lesson: ASW Communications and Voice Reports	<p>EO 1-5-3-1.1 IDENTIFY and LIST the primary external communications circuits covered during ASW activities. To include:</p> <ul style="list-style-type: none"> TG Cmd TG Tac ASW C&R SATCOM/HF Ckts ASW A/C Ckts SM Ckts Supporting Commands and Shore Authorities <p>EO 1-5-3-1.2 FORMAT and DELIVER the following ASW voice reports:</p> <ul style="list-style-type: none"> Contact Reports Datum Report Amplifying Reports Emergency Tango Reports Dogbox Report <p>EO 1-5-3-1.3 FORMAT and DELIVER SAU specific voice reports, to include:</p> <ul style="list-style-type: none"> SAUC Intentions Formations ZigZag Plans Search and Attack Plans Weapon Engagement Orders SAUC Sitreps
PHASE IV TO	<p>TO 1-5-4-1 EMPLOY own and external ship assets in an ASW environment, to include the following:</p> <ul style="list-style-type: none"> Integrated Undersea Surveillance System (IUSS) Fixed Wing Assets Rotary Wing Assets Weapons Employment Torpedo Countermeasures Principles Maneuvering with and without ADC Surface Ship Radiated Noise <p>TO 1-5-4-2 Given an enemy's Detect to Engage sequence scenario, EXECUTE appropriate torpedo countermeasures to avoid damage to Ownship and the HVU by disrupting the enemy's kill chain.</p> <p>TO 1-5-4-3 EMPLOY appropriate ASW weapons(s) and weapon attack options.</p>

UNCLASSIFIED

CURRICULUM OUTLINE OF INSTRUCTION
SURFACE WARFARE OFFICER DEPARTMENT HEAD COURSE
CIN: A-4H-0107 **CDP: 9545**

Topic 1-5-4-1, Lesson: IUSS	EO 1-5-4-1.1 DESCRIBE the components and capabilities of IUSS, to include the following: SURTASS LFA SOSUS FDS ADS EO 1-5-4-1.2 DESCRIBE the processing and transmission of acoustic data from IUSS components to a SG. EO 1-5-4-1.3 DETERMINE how IUSS supports ASW for the SG, to include how a TAO/ASWE can make tactical use of this information.
Topic 1-5-4-2, Lesson: Fixed Wing Assets	EO 1-5-4-2.1 LIST and DESCRIBE the sensor capabilities and limitations of P-3C variants in support of ASW operations. EO 1-5-4-2.2 LIST and DESCRIBE weapons employment of P-3C variants in support of ASW operations EO 1-5-4-2.3 DESCRIBE the five phases of an ASW prosecution to include: Mission Planning Search Localize Track Attack
Topic 1-5-4-3, Lesson: Rotary Wing Assets	EO 1-5-4-3.1 LIST and DESCRIBE the sensor capabilities and limitations of the H-60 variants in support of ASW operations. EO 1-5-4-3.2 LIST and DESCRIBE weapons employment of the H-60 variants in support of ASW operations EO 1-5-4-3.3 LIST and DESCRIBE how the H-60 B/R coordinates with surface forces to include the following: Search Localize Track Attack
Topic 1-5-4-4, Lesson: Weapons Employment	EO 1-5-4-4.1 IDENTIFY, DESCRIBE and EMPLOY the appropriate ASW weapons attack option to include the following: Counterfire Urgent Attack Deliberate Attack Re-attack Criteria EO 1-5-4-4.2 IDENTIFY, DESCRIBE and EMPLOY the appropriate ASW weapon, to include the following: Mk 46 5A(S) Mk 46 5A(SW) Mk 54 VLA

UNCLASSIFIED

UNCLASSIFIED

CURRICULUM OUTLINE OF INSTRUCTION
SURFACE WARFARE OFFICER DEPARTMENT HEAD COURSE
CIN: A-4H-0107 **CDP: 9545**

	EO 1-5-4-4.3 IDENTIFY next generation ASW weapons capabilities, to include the following: Depth Bombs Super Cavitating Rods Common Very Light Weight Torpedo (CVLWT) High Altitude ASW weapons concept (HAAWC)
Topic 1-5-4-5, Lesson: Torpedo Countermeasures Principles	EO 1-5-4-5.1 DESCRIBE and EMPLOY proactive measures to prepare the ship for entering a Torpedo Danger Area (TDA), to include the following: Material Countermeasures Acoustic Device Countermeasures Deception Countermeasures Procedural Countermeasures
Topic 1-5-4-6, Lesson: Maneuvers with/without ADCs	EO 1-5-4-6.1 DRAW , DESCRIBE and EXECUTE appropriate Torpedo Countermeasure Maneuvers (TCMs) in both single ship and multi-ship (SG) environments.
Topic 1-5-4-7, Lesson: COVE TCM	EO 1-5-4-7.1 DEMONSTRATE appropriate Torpedo Countermeasures Maneuvers (TCMs).
Topic 1-5-4-8, Lesson: NAVSEA Surface Ship Radiated Noise (NOFORN)(VL)	EO 1-5-4-8.1 RECOGNIZE the benefits to the ASW environment of properly controlled radiated noise to include maintenance of sound dampening equipment. EO 1-5-4-8.2 DESCRIBE the benefits of a Ship's Self Radiated Noise Measurement (SSRNM). EO 1-5-4-8.3 EXPLAIN the relationship between ships noise and speed to include: How to EMPLOY the PRAIRIE & MASKER air system. EXPLAIN the effects of cavitations. EO 1-5-4-8.4 EXPLAIN what equipment and procedures would be found on a Quiet Ship Bill. EO 1-5-4-8.5 EXPLAIN the benefits of deperming and degaussing.
Topic 1-5-4-9, Lesson: NAVSUBSCOL SSN Operations and Threat Tactics (VL)	EO 1-5-4-9.1 DESCRIBE the principles for conducting ASW operations in a multi-platform environment. EO 1-5-4-9.2 DESCRIBE US SSNs national-level tasking and tactical employment. EO 1-5-4-9.3 DESCRIBE the capabilities and limitations affecting tactical employment of US SSNs.
Topic 1-5-4-10, Lesson: NUWC SSK Operations and Threat Tactics (VL)	EO 1-5-4-10.1 DESCRIBE the capabilities and limitations affecting tactical employment of SSKs and of Air Independent Propulsion (AIP) submarines. EO 1-5-4-10.2 DESCRIBE the missions and tactics of the diesel, and Air Independent Propulsion (AIP) submarines
Phase V TO	TO 1-5-5-1 DEMONSTRATE and CONDUCT ASW procedures, to include:

UNCLASSIFIED

**CURRICULUM OUTLINE OF INSTRUCTION
SURFACE WARFARE OFFICER DEPARTMENT HEAD COURSE
CIN: A-4H-0107 CDP: 9545**

	<p>Passive Techniques Active Techniques ASW Screens Detect to Engage Ship Aircraft Integration SAU Procedures</p> <p>TO 1-5-5-2 DEMONSTRATE application of passive ASW principles.</p> <p>TO 1-5-5-3 CONDUCT active ASW.</p> <p>TO 1-5-5-4 Given an ASW scenario, correctly EMPLOY ASW sensors in varying environments to detect threat submarines.</p> <p>TO 1-5-5-5 EMPLOY multiple assets in a ASW environment, to include the following: Maritime Patrol Reconnaissance Aircraft (MPRA) Waterspace Management (WSM) Submarine Operations Integrated Undersea Surveillance Systems (IUSS)</p> <p>TO 1-5-5-6 DESCRIBE the optimum employment of all available assets, sensors, weapons, and tactics while operating in a Strike Group (SG) against a submarine threat, considering ocean conditions, submarine types, threat capabilities, and command and control relationships.</p>
<p>Topic 1-5-5-1, Lesson: Passive Techniques</p>	<p>EO 1-5-5-1.1 RECOGNIZE the importance of conducting passive acoustic and non-acoustic missions.</p> <p>EO 1-5-5-1.2 APPLY passive techniques to include the following: Area search Sensor performance Uniform and efficient search rules Maneuver Detect Tracking/Target Motion Analysis (TMA)</p> <p>EO 1-5-5-1.3 Given required materials, CONSTRUCT an evaluator plot.</p> <p>EO 1-5-5-1.4 Given an evaluator plot, IDENTIFY the cones of courses.</p> <p>EO 1-5-5-1.5 Given range formulas, SOLVE problems for single and double-leg Ekelund ranges.</p> <p>EO 1-5-5-1.6 IDENTIFY the systems that will detect torpedoes in a timely manner, to include the following: Towed Array Sonar TRAFS Hull Mounted Sonars DIFAR Sonarbuoys</p>

UNCLASSIFIED

CURRICULUM OUTLINE OF INSTRUCTION
SURFACE WARFARE OFFICER DEPARTMENT HEAD COURSE
CIN: A-4H-0107 **CDP: 9545**

	Visual WQC-2
Topic 1-5-5-2, Lesson: MMTT 12	EO 1-5-5-2.1 DEMONSTRATE the ability to CONSTRUCT an evaluator plot and SOLVE problems for single and double-leg Ekelund ranges.
Topic 1-5-5-3, Lesson: Active Techniques	EO 1-5-5-3.1 APPLY Furthest On Circles (FOC) to a datum. EO 1-5-5-3.2 CALCULATE the following: Torpedo Danger Zone (TDZ) Limiting Lines of Approach (LLOA) Estimated Time of Arrival to Torpedo Danger Area (ETA TDA)
Topic 1-5-5-4, Lesson: ASW Screen	EO 1-5-5-4.1 DEMONSTRATE an understanding of the factors and features required to design an ASW screen to include: Purpose of an ASW screen The factors that need to be considered in designing a screen Main features within a screen construction EO 1-5-5-4.2 DESIGN a simple ASW screen using SCREENPLANNER.
Topic 1-5-5-5, Lesson: Detect to Engage	EO 1-5-5-5.1 DESCRIBE the difference between an active and passive detect to engage sequence. EO 1-5-5-5.2 APPLY correct preplanned response in accordance with the ASW OPTASK, to include: Execution of datum search Execution of area search Actions outside the TDA Actions on entering the TDA Actions on gaining initial sonar contact Actions on losing contact Applications of attack train principles Application of BDA EO 1-5-5-5.3 Correctly IDENTIFY the classifications of subsurface contacts. EO 1-5-5-5.4 LIST and DESCRIBE acoustic/non-acoustic, active/passive sensors employed in gaining contact on a submarine. EO 1-5-5-5.5 LIST and DESCRIBE the components of the attack hierarchy in accordance with the ASW OPTASK. EO 1-5-5-5.6 DISCUSS ROE requirements associated with ASW.
Topic 1-5-5-6, Lesson: Ship / Aircraft Integration	EO 1-5-5-6.1 INTEGRATE an ASW helicopter into an active DTE sequence. To include the following: APPLY helicopter sensors for best effect in the search phase EMPLOY a helicopter in the investigation/localization phase APPLY helicopter sensors for best effect in the tracking phase DETERMINE optimal employment of a helicopters weapons in the attack phase EMPLOY helicopter sensors to conduct BDA DETERMINE re-attack criteria

UNCLASSIFIED

UNCLASSIFIED

**CURRICULUM OUTLINE OF INSTRUCTION
SURFACE WARFARE OFFICER DEPARTMENT HEAD COURSE
CIN: A-4H-0107 CDP: 9545**

Topic 1-5-5-7, Lesson: MMTT 13/14	EO 1-5-5-7.1 DEMONSTRATE the ability to APPLY correct DTE procedures. EO 1-5-5-7.2 DEMONSTRATE the ability to INTEGRATE an ASW helicopter into an active DTE sequence.
Topic 1-5-5-8, Lesson: SAU Procedures	EO 1-5-5-8.1 DESCRIBE and APPLY correct SAU active DTE procedures to include the following: <ul style="list-style-type: none"> Execution of a datum search Execution of area search SAU Commander Intentions Actions outside the TDA Actions on entering the TDA Actions on gaining initial sonar contact Actions on losing contact Applications of attack train principles Application of BDA EO 1-5-5-8.2 CALCULATE and APPLY correct SAU spacing based on current environments.
Topic 1-5-5-9, Lesson: MMTT 15	EO 1-5-5-9.1 DEMONSTRATE correct SAU active DTE procedures.
Topic 1-5-5-10, Lesson: MMTT B	EO 1-5-5-10.1 DEMONSTRATE an ability to act as a TAO during single ship, SAU, choke-point or barrier search operations.
Topic 1-5-11-4, Lesson: USW Lesson Review	
Topic 1-7-1, USW COL Quiz: # 1	
Topic 1-7-2, USW COL Quiz: # 2	
Topic 1-7-3, USW COL Quiz: # 3	
Topic 1-7-4, USW COL Quiz: # 4	
Topic 1-7-5, USW COL Exam: Final	

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CURRICULUM OUTLINE OF INSTRUCTION
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MODULE 1-6: MINE WARFARE (MIW)	
Lesson/Topic	Learning Objectives
Lesson 1-6-1: Mine Warfare	TO 1-6-1.1 Given in-class discussions and activities, DETERMINE the actions taken by Ownship prior to entering a mine threat area and after sighting a mine.
CBT Module 4 Lesson 8: Introduction to Mine Warfare	TO 4-8.1 IDENTIFY various types of mines, delivery vehicles, and actuation methods.
Topic 1: Mine Identification	EO 4-8-1.1 IDENTIFY frequently used US Navy and foreign mines.
Topic 2: Field Types and Delivery Vehicles	EO 4-8-2.1 IDENTIFY frequently used mine field types and delivery vehicles.
Topic 3: Mine Actuation	EO 4-8-3.1 IDENTIFY the different stages of mine detonation and the different ways mines can be actuated.
Topic 1-6-1-1: Mine Warfare Challenges	EO 1-6-1-1.1 Given in-class discussions, DESCRIBE conceptual aspects of Mine Warfare (MIW) challenges to include the following: <ul style="list-style-type: none"> • Coordination between ASW, MIW, and EW • Mine warfare environmental considerations • Minesweeping vs. minehunting • Airborne MCM (AMCM) vs. Surface MCM (SMCM) • Vulnerability EO 1-6-1-1.2 Given in-class discussions, DETERMINE the applicable useful mine warfare information available from the following systems: <ul style="list-style-type: none"> • Mine Warfare Environmental Decision Aid Library (MEDAL) • GCCS-M
CBT Module 4 Lesson 9: Mine Countermeasures Assets	TO 4-9.1 IDENTIFY the available Mine Countermeasures (MCM) assets.
Topic 1: Mine Countermeasure Forces	EO 4-9-1.1 IDENTIFY MCM forces, including: <ul style="list-style-type: none"> • Surface. • Undersea. • Airborne. • Very Shallow Water.
Topic 2: Future of Mine Warfare	EO 4-9-2.1 IDENTIFY the following: <ul style="list-style-type: none"> • Organic MCM • Remote Minehunting System (MCM) WLD-1(V) 1 • MH-60S • Airborne Laser Mine Detection System (ALMDS) • AQS-24 Airborne Minehunting Sonar • Organic Airborne and Surface Influence Sweep (OASIS) • Airborne Mine Neutralization System (AMNS) • Rapid Airborne Mine Clearance System (RAMICS) • BLQ-11 Mine Reconnaissance System Unmanned Underwater Vehicle (UUV)

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CURRICULUM OUTLINE OF INSTRUCTION
SURFACE WARFARE OFFICER DEPARTMENT HEAD COURSE
CIN: A-4H-0107 **CDP: 9545**

Topic 1-6-1-2: Active Mine Countermeasures	EO 1-6-1-2.1 Given in-class discussions, DESCRIBE the employment of Active Mine Countermeasures.
Topic 1-6-1-3: Passive Mine Countermeasures	EO 1-6-1-3.1 Given in-class discussions and activities, DESCRIBE conceptual aspects and steps taken to conduct Passive Mine Countermeasures.

USW Curriculum Manager

USW Cell Lead

Director N73

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