

**MASSACHUSETTS MARITIME ACADEMY  
DEPARTMENT OF MARINE TRANSPORTATION**

**ADVANCED SEAMANSHIP (MT4132)**

**Fall 2012**

**I. LEARNING OBJECTIVES**

Operating a vessel safely and efficiently in all conditions of weather requires a seaman's knowledge of the vessel's fittings and equipment and the practical skill set necessary to operate and maintain the vessel. Through hands on experience under the supervision of experienced master mariners, this program of study provides the student the opportunity to build seamanship skills. Case studies based on marine, casualty investigations are employed to reinforce learning objectives and promote both critical thinking and problem solving. This cap stone course in advanced seamanship is designed to provide the new deck officer with a strong foundation in the fundamentals of traditional seamanship and an exposure to the "best practices" in the ever evolving shipboard technologies and operations necessary to compete globally in the marine industry.

**II. LEARNING OUTCOMES**

The student will be able to explain the function and limitations of each component of ground tackle. The student will be able to describe the different types of moorings and explain the correct application of each mooring technique. The student will be able to calculate optimal length of chain for the prevailing geographic and environmental conditions. The student will be able to compute the maximum radius of swing. The student will be able to explain the application of controllable forces in shiphandling including: propeller forces, rudder forces, thrusters, auxiliary propulsion units, lines, tugs and ground tackle. The student will be able to contrast the advantages and disadvantages of different types of marine propulsion systems. The student will be able to demonstrate fundamental shiphandling techniques through the operation of the academy's small crafts and manned models. The student will be able to compute propeller slip and speed by revolution. The student will be able to discuss the effects of uncontrollable forces in shiphandling including: hydrodynamic interaction, current, and wind. The student will be able to describe the effects of speed, drift angle and pivot point on the maneuvering characteristics of a vessel in both deep and shallow water. The student will be able to calculate squat and the maximum transit speed to insure a minimum under keel clearance. The student will be able to describe the different attributes of mooring lines based on their respective material, construction, size and length. The student will be able to explain the application of different mooring patterns. The student will be able to calculate mooring line stress. Gaining hands on experience, the student will be able to

demonstrate the safe methods of handling mooring lines under heavy loads. The student will be able to explain the advantages and disadvantages of different modes of towing. Through hands on operations, the student will be able to demonstrate the advantages and disadvantages of maneuvering a tow made up alongside and maneuvering a tow pushed ahead. The student will be able to list the actions to be taken immediately after grounding and explain the different methods to refloat a vessel. The student will be able to execute basic stranding calculations critical to the early stages of a successful salvage. The student will be able to explain the fundamentals of ice seamanship including: types of ice, risks of ice passage, and operating with and without icebreaker assistance. The student will be able to identify the hazards inherent in marine helicopter operations and list controls to reduce the risk to personnel. The student will be able to list the phases of a search and rescue operation from awareness to mission conclusion. The student will be able to discuss the roll of a merchant ship in a coordinated SAR mission. Based on given parameters, the student will be able to identify the optimal type of search pattern to employ.

### III. INSTRUCTOR

Mate Vacha

#### Lab Instructors:

Capt. Edward Bruce

Capt. Kirt DeCicco

### IV. TEXTS

SEAMANSHIP NOTES, 8th. Edition

KNIGHT'S MODERN SEAMANSHIP, 18th Edition

AMERICAN MERCHANT SEAMAN'S MANUAL, 7th Edition

AMERICAN PRACTICAL NAVIGATOR Vol. I, 2002 Edition

*(available on line: <http://www.nga.mil/>)*

INTERNATIONAL AERONAUTICAL AND MARITIME SEARCH AND RESCUE (IAMSAR) MANUAL, Vol. 3 (optional)

## V. GRADING

*"If something exists, it exists in some amount. If it exists in some amount, then it is capable of being measured."* Rene Descartes, Principles of Philosophy, 1644

- A. Tests, integral assessments, will be administered every other week during the semester. The purpose of the bi-weekly tests is:
- to measure the student's progress
  - to provide feedback
  - to provide motivation
- Approximately one third of each test will be based on material found solely in the assigned readings.** In addition, the instructor reserves the right to administer short unannounced tests at his discretion.
- B. A student who misses a test due to an authorized absence must personally notify the instructor prior to the test missed. A student who does not follow this procedure will be considered an unauthorized absentee and will receive a grade of zero for the test missed.
- C. A comprehensive final examination will be given in the period designated by the Registrar during the final examination week at the end of the semester. The final examination for the lecture segment of the course will be approximately one third of the lecture segment final grade.
- D. The final grade for the course will be computed based on the lecture segment being 85% and the lab segment being the remaining 15%.

## VI. MISCELLANEOUS

- A. Each student is responsible for assignments and work covered in the class and lab whether he/she is present or not.
- B. Attendance is a course requirement and is mandatory. All unauthorized absences will be reported to the Commandant's Office. Further, more than four class and/or lab absences will result in a reduction of the final grade by one full letter grade.
- C. Office hours are established to allow the student the opportunity to consult with the instructor. If you are having a problem, do not hesitate to see your instructor. The instructor will be pleased to schedule tutoring.

- D. Massachusetts Maritime Academy is committed to providing reasonable accommodations to students with documented disabilities. Students who believe they may need accommodations in this class are required to contact Mrs. Fran Tishkevich, Director of Disability Compliance (Ext.2208).
- E. Electronic communication devices, any telecommunication device that emits an audible signal, vibrates, displays a message, or otherwise summons or delivers a communication to the possessor including but not limited to: cell phones, iPhones and Blackberries, are prohibited from this class. In the event of a medical condition or personal circumstance necessitating the cadet to be in touch with a doctor or a parent, a reasonable accommodation will be made between the instructor and the cadet. Failure to comply with this directive will result in the following report offence, *disobedience of a direct order*.
- F. You will be treated and expected to conduct yourselves as the professionals you are aspiring to be.

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<b>WEEK</b> <b>1</b>	<b>COURSE INTRODUCTION &amp; GROUND TACKLE REVIEW</b>	
	Anchor Design And Use Anchor Kinematics Chain Design Anchor Machinery And Associated Fittings And Equipage	SEA NOTES pp.1-1 to 1-12 K.M.S. 116-140 A.M.S.M. Ch. 8
	<b>Audio Visual Presentation</b> VHS Film: <i>Ships of Shame</i>	
<b>WEEK</b> <b>2 &amp; 3</b>	<b>ANCHORING AND MOORING</b>	
	Scope of Chain Holding Power Anchoring Procedure and Safety Considerations Riding to a Single Anchor Mooring (Riding to Two Anchors) Mediterranean Moor Mooring at Offshore Terminals Radius of Swing Calculations Scope and Length of Chain Calculations	SEA NOTES pp.2-1 to 2-23 K.M.S. 282-301 A.M.S.M. Ch. 8

**WEEK  
4 & 5**

**SHIP MANEUVERING  
CONTROLLABLE EFFECTS**

Type Of Machinery  
Horse Power To Displacement Ratio  
Propellers: Number And Type  
Propeller Forces  
Rudders: Number And Type  
Rudder Forces  
Resultant Forces Of Rudder And Propeller  
Maneuvering Devices: Thrusters And  
Auxiliary Propulsion Units  
Dredging An Anchor  
Displacement, Trim, List and Heel.  
Speed by Revolution Calculations

SEA NOTES pp.3-1 to 3-33  
K.M.S. pp. 95-115  
pp. 241-254  
A.M.S.M. pp. 9-7 to 12

**Audio Visual Presentation:**

VHS Film: *Shiphandling II*  
Slides: *Ship Rudder*

**WEEK  
5 & 6**

**SHIP MANEUVERING  
UNCONTROLLABLE EFFECTS**

Hydrodynamic Forces And Interactions  
Interaction Situations  
Passing Ship Effects  
Ship Squat And Its Calculation  
Bank Effects  
Current  
Aerodynamic Interactions - Wind

SEA NOTES pp.3-34 to 3-43  
K.M.S. pp. 255-261  
A.M.S.M. pp. 9-7 to 12

**Audio Visual Presentation:**

VHS Film: *Shiphandling III*

**WEEK**  
**7**

**SHIP MANEUVERING**

Drift Angle  
Pivot Point  
Maneuvering Characteristics  
Speed  
Turning  
Requirements For And Limitations Of  
Displayed Maneuvering Information  
Man Overboard Techniques  
Deceleration And Stopping Maneuvers  
Instruments to Assist in Judging Motion

SEA NOTES pp.3-43 to 3-58  
K.M.S. pp. 261-264

**Audio Visual Presentation:**

VHS Film: *Shiphandling I*

**WEEK**  
**8 & 9**

**DOCKING AND UNDOCKING  
PROCEDURES**

Mooring Line Pattern  
Relative Characteristics Of Mooring Line:  
Material, Construction, Size And  
Elasticity  
Attributes Of A Mooring Line  
Bights And Three Part Leads  
Communication And Line Handling  
Commands  
Deck Winch Machinery  
Lead Angles  
Safety And Operational Considerations  
Mooring Line Inspection  
Mooring Line Calculations

SEA NOTES pp. 4-1 to 4-15  
K.M.S. pp.271-282  
A.M.S.M. pp. 4-8 to 17

**Audio Visual Presentation**

VHS Film:

*Snap Back*  
*Steutgard Field Test*  
*The Theory of Mooring and Its*  
*Application*  
*Spectra 12*

**WEEK  
10 & 11**

**TUGS AND TOWING**

Tug Function  
Tug Design Characteristics  
Ship Assist Practice  
Sheltered Water Towing  
Open Ocean Towing  
Emergency Towing  
Tug and Towing Safety

SEA NOTES pp. 5-1 to 5-44  
K.M.S. pp. 306-318

**Audio Visual Presentation**

VHS Films:

*Tractor Tugs in Panama Canal*  
*Voith Schneider Training Film*  
*MSC Passing a Emergency Tow Line*

**WEEK  
12**

**STRANDING AND SALVAGE  
OPERATIONS**

Actions Taken Immediately After Stranding  
Precautions Against Broaching, Pounding and  
Further Grounding  
Methods of Refloating  
Stranding Calculations

SEA NOTES pp. 6-1 to 6-11  
K.M.S. pp. 306-318

**Audio Visual Presentation**

Slides: *Stranding and Salvage Operations*

**WEEK  
13**

**ICE SEAMANSHIP**

Types Of Floating Ice  
Ice Identification  
Risks Of Ice Passage  
Anchoring & Towing In Ice  
Ice Accretion And Vessel Stability  
Freeing A Beset Vessel While Operating  
Independently  
Freeing A Beset Vessel With Icebreaker  
Escort

SEA NOTES pp. 7-1 to 7-21  
K.M.S. pp. 382-402  
A.P.N. pp. 453-479

**Audio Visual Presentation**

Slides: *USS EDISTO Arctic Transit*



**WEEK  
14**

**HELICOPTER OPERATIONS**

Vessel Responsibilities And Preparations  
Dangers And Personnel Safety  
Personnel Approaching The Helicopter  
Helicopter Operating Conditions  
Maneuvering Vessel  
Shipboard Hoisting And Landing

SEA NOTES pp. 8-1 to 8-12  
K.M.S. pp. 372-381  
IAMSAR Vol. III

**WEEK  
15**

**SEARCH AND RESCUE OPERATIONS**

Sources of SAR Information Including  
    AMVER Reporting  
SAR Planning  
On-Scene Coordination  
Search Patterns  
Terminating the Search

SEA NOTES pp. 9-1 to 9-15  
IAMSAR Vol. III (optional)