

MASSACHUSETTS MARITIME ACADEMY

ADVANCED SEAMANSHIP

MT-4132 Fall 2022

COURSE

Advanced Seamanship

CREDITS

4 / Three (1)hour lecture meetings and one (2) hour lab meeting per week

COURSE INFORMATION

Description: Operating a vessel safely and efficiently under all weather conditions requires a skill set for operating and maintaining a vessel and a knowledge of a vessel's fittings and equipment. Under the supervision of experienced master mariners, students in this program develop seamanship skills through hands-on experience and learn critical thinking and problem-solving skills through the use of case studies of marine casualty investigations. This capstone course provides the new deck officer with a strong foundation in the fundamentals of traditional seamanship and exposes the individual to best practices in the ever-evolving shipboard technologies and operations necessary to compete in the global marine industry. Topics include search and rescue, damage control, marine salvage, tug and towing fundamentals, ice navigation, anchoring/mooring, ship/helicopter operations, and advanced ship handling techniques. An intensive, hands-on seamanship lab program complements the classroom experience. [Lab time required]

Prerequisites: Basic Seamanship (MT-2231)

(If you do not meet this prerequisite you are to notify the instructor immediately. Discovery of failure to comply with the prerequisite requirements, at a later time, will result in a failing grade for the course, despite what your grade may have been)

COURSE OBJECTIVES

STCW Knowledge-Based Learning Objectives:

Completion of this course will demonstrate knowledge and understanding of the following STCW elements:

- [OICNW-A5.2](#) Initial action to be taken following a collision or a grounding
- [OICNW-A5.2](#) Initial damage assessment and control
- [OICNW-A5.3](#) Appreciation of the procedures to be followed for rescuing persons from the sea
- [OICNW-A6.1](#) Knowledge of the contents of the International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual
- [OICNW-A9.1](#) the effects of deadweight, draught, trim, speed and under-keel clearance on turning circles and stopping distances
- [OICNW-A9.1](#) the effects of wind and current on ship handling
- [OICNW-A9.1](#) maneuvers and procedures for the rescue of person overboard
- [OICNW-A9.1](#) squat, shallow-water and similar effects
- [OICNW-A9.1](#) proper procedures for anchoring and mooring

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- [OICNW-A5.3](#) Appreciation of the procedures to be followed for assisting a ship in distress

Other Objectives:

After completing this course, students should be able to:

- Explain the function and limitations of each component of ground tackle.
- Describe the different types of moorings and explain the correct application of each mooring technique.
- Calculate optimal length of chain for the prevailing geographic and environmental conditions.
- Compute the maximum radius of swing.
- Explain the application of controllable forces in shiphandling including: propeller forces, rudder forces, thrusters, auxiliary propulsion units, lines, tugs and ground tackle.
- Contrast the advantages and disadvantages of different types of marine propulsion systems.
- Demonstrate fundamental shiphandling techniques through the operation of the academy's small crafts and manned models.
- Compute propeller slip and speed by revolution.
- Discuss the effects of uncontrollable forces in shiphandling including: hydrodynamic interaction, current, and wind.
- Describe the effects of speed, drift angle and pivot point on the maneuvering characteristics of a vessel in both deep and shallow water.
- Calculate squat and the maximum transit speed to insure a minimum under keel clearance.
- Describe the different attributes of mooring lines based on their respective material, construction, size and length.
- Explain the application of different mooring patterns.
- Calculate mooring line stress. Gaining hands on experience,
- Demonstrate the safe methods of handling mooring lines under heavy loads.
- Explain the advantages and disadvantages of different modes of towing. Through hands on operations,
- Demonstrate the advantages and disadvantages of maneuvering a tow made up alongside and maneuvering a tow pushed ahead.
- List the actions to be taken immediately after grounding and explain the different methods to refloat a vessel.
- Execute basic stranding calculations critical to the early stages of a successful salvage.
- Explain the fundamentals of ice seamanship including: types of ice, risks of ice passage, and operating with and without icebreaker assistance.
- Identify the hazards inherent in marine helicopter operations and list controls to reduce the risk to personnel.
- List the phases of a search and rescue operation from awareness to mission conclusion.
- Discuss the roll of a merchant ship in a coordinated SAR mission.
- Identify the optimal type of search pattern to employ based on given parameters.

Observation during laboratory and grading of tests and examinations will be used to determine satisfaction of these objectives.

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COURSE OUTCOMES

As a result of completing the course and successfully passing the associated examinations, Cadets will:

- Demonstrate knowledge of principles of ship's maneuvering characteristics
- Demonstrate ability to perform simple maneuvers and operations with varying vessels
- Demonstrate knowledge of safe mooring and the line handling
- Demonstrate proper voyage planning principles and techniques
- Safely practice and execute the duties of a licensed deck officer in the performance of mooring, line handling, ground tackle use, tug use, stranding and salvage operations
- Demonstrate knowledge to safely operate in ice areas
- Demonstrate knowledge to execute a search and rescue operation
- Demonstrate knowledge to utilize helicopters and use to operate in heavy weather

Grading of tests and examinations will be used to determine satisfaction of these outcomes.

COURSE CONDUCT

It is expected all students will soon be ship's officers. They will be addressed and treated as such.

- Course conduct will be in accordance with the MMA regimental system. All students **shall** wear the appropriate uniform of the day to each class and laboratory.
- The MMA honor code will be strictly followed during the course of the semester. Any submitted work be that examinations, tests, exercises, assignments, etc. is expected to be only your work. No outside sources may be used in the production of your work. No collaboration with any individual is permitted unless specifically authorized by the instructor for example during lecture breakout sessions. If the instructor has any concern about a possible violation of the MMA Honor Code, the submitted work will be given a grade of zero and the instance may be pursued with the Commandant of Cadets after referral to the Vice President of Academic Affairs. In serious cases, violations of the Honor Code may result in dismissal from the Academy.
- Cell phone texting or calls during class sessions is not permit, regardless of whether a student is participating in-person or on-line. **Cell phones *SHALL* be put away and remain away until the end of class, unless otherwise directed by the instructor. Use of your cell phone during lecture will result in immediate dismissal from class and a zero for that day's class. Repeated violations of this classroom policy may result in a reduction of your overall grade by one letter grade and a report of the repeated violations to Dean of Undergraduate Studies and/or VP of Academic Affairs.**
- Laptop computer use for social media or Internet surfing during class time is strictly prohibited. **Repeated violations of this classroom policy may result in a reduction of your overall grade by one letter grade and a report of the repeated violations to Dean of Undergraduate Studies and/or VP of Academic Affairs**
- Only covered drinks will be permitted in the classroom.

ATTENDANCE

- Since this is an STCW course, no allowance for unexcused absence will be made.
- Missing more than three meetings of lecture and/or one meeting of lab for ANY reason will result in at least one full letter reduction of your final grade, or an incomplete, or possibly a failing grade for the course.
- It is your duty to keep up with the material, and to arrange to make up any tests, exercises, assignments, or examinations of material missed **in advance**. Make your arrangements beforehand, or a zero will be recorded for that work.
- Assignments and exercises **will not be accepted for credit past their due date**.

Mass Maritime Academy is committed to providing reasonable accommodations to students with documented disabilities. The Director of Disability Resources works in collaboration with the Dean of Undergraduate Studies, faculty, and other campus departments to provide support for students with learning disabilities, as outlined in the Americans with Disabilities Act of 1990. A student who feels they may need an accommodation based on the impact of a disability should access Disability Resources at <https://www.maritime.edu/ada> to discuss specific needs.

Thereafter, you must make your instructors aware of any determined accommodations so that they may be implemented.

REQUIRED TEXTBOOK:

Seamanship Notes, 8th ed., Captain P. Modic (will be issued to you during the first lecture meeting)

Recommended Texts:

Knights of Modern Seamanship – (KMS) 8th ed.

American Merchant Seamen's Manual 7th ed.

American Practical Navigator Vol. 1, 2017 ed. (available on-line)

REFERENCES

Materials used to develop course content in addition to the text will be identified in lecture notes and slides.

GRADING POLICY

- It is planned that four (4) to five (5) unit tests will be administered during lecture meetings. Tests will be announced and given during a full or partial lecture period the duration of each will be determined by the instructor.
 - A single final examination will be held at the conclusion of the course. It will be a cumulative capstone examination covering all of the content of the course.
 - Examinations and tests may utilize written materials consisting of any of the following or a combination of such; multiple choice questions, fill in the blank, true or false, short answer, or technical sketches.
 - STCW knowledge-based assessments will be conducted as part of this course and incorporated into the tests and examination. Students are required to achieve a minimum grade of 70% in this course to satisfy the knowledge components of STCW. **Students failing to achieve a minimum grade of 70% will be required to retake this course and achieve a minimum grade of 70% prior to graduation.**
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- Class Participation, Attendance, Assignments: 10%
 - Lecture Tests: 40%
 - Lab Grade 30%
 - Final Examination: 20%

Final Course Grading:

100 - 93%	A	72.9 - 70%	C-
92.9 - 90%	A-	69.9 - 67%	D+
89.9 - 87%	B+	66.9 - 63%	D
86.9 - 83%	B	62.9 - 60%	D-
82.9 - 80%	B-	Below 60%	F
79.9 - 77%	C+		
76.9 - 73%	C		

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INSTRUCTOR

Lecture:

Lt. Lukas Sunkler Office # 318A lsunkler@maritime.edu

Office Hours: Mon. 0900-1050, Thurs. 1000-1050 ***any other time by appointment.***

Lab:

Lt. Sunkler

Lt. White

Lt. Pelosi

It is our duty is to:

- guide you through the material,
- answer all your questions, e-mails, texts, etc.,
- be available should you need further explanation, and
- promptly return and comment on assignments, quizzes and tests.

It is your responsibility to:

- Come to class prepared to discuss the reading and subject matter for that day,
- Actively participate in classroom discussions,
- Stop me at any point that you don't understand as I will be glad to go over it again, and
- Learn the material.

Your comprehension of the material can only come from your active involvement in the reading assignments and the lectures.

It is our personal goal to see each and every one of you to succeed with this material. If you feel you are falling behind or are having trouble understanding some of the subject matter, and I have not detected this on my own, be sure to contact one of us for extra help. We will be available for as long as it takes to help you.

TOPICS / LESSON PLAN:

WEEK 1

COURSE INTRODUCTION & GROUND TACKLE REVIEW

Anchor design and use
Anchor Kinematics
Chain Design
Anchor machinery & associated fittings
Associated equipment

READING ASSIGNMENTS

Sea Notes pg. 1-1 to 1-12
KMS pg. 116 to 141
AMSM CH 8

WEEK 2&3

ANCHORING & MOORING WITH ANCHORS

Scope of chain & Calculations Sea Notes pg. 2-1 to 2-23
Holding Power KMS pg. 282 to 301
Anchoring procedure and safety measures
Riding to single anchor
Radius of swing
Dredging (dragging) of anchor

Mooring with two anchors

- a) Open Moor
- b) Running Moor
- c) Standing Moor
- d) Mediterranean Moor

Mooring to Buoy

- a) Single Offshore or mooring buoy
- b) Two buoy mooring
- c) Multiple buoy Offshore terminal
- d) Anchor Watch

WEEK 4

SHIP MANEUVERING & CONTROLLABLE EFFECTS

Type of Machinery Sea Notes pg. 3-1 to 3-33
Horsepower to displacement ratio KMS pg. 95 to 115
Propellers: Number, type KMS pg. 241 to 254

Rudders: forces and resultant forces on rudder

AMSM pg. 9-7 to 9-12

Speed by Revolution calculations
Maneuvering devices : thrusters and Auxiliary propulsion units

WEEK 5 & 6

SHIP MANVRING. & UNCONTROLLABLE EFFECTS

Hydrodynamic forces & interaction Sea Notes pg. 3-34 to 3-58
Interaction situations KMS pg. 225 to 261
Passing ship effects AMSM pg. 9-7 to 9-12
Ship squat & calculations
Bank effects
Current
Aerodynamic Interactions (Wind)

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WEEK 11

STRANDING & SALVAGE OPERATIONS

Actions taken immediately after stranding

Sea Notes pg. 6-1 to 6-12

Precautions against broaching, pounding
& further grounding

KMS pg. 372 to 381

Methods of re-floating
Stranding calculations

WEEK 12

ICE SEAMANSHIP

Types of floating ice

Sea Notes pg. 7-1 to 7-21

Ice identification

KMS pg. 382 to 402

Risk of ice passage

Bowditch Ch. 32

Anchoring & Towing in Ice

Mooring in ice

Ice accretion & vessel stability

Freeing a vessel beset while operating independently

Freeing a vessel beset with ice breaker escort

WEEK 13

HELICOPTER

Vessel responsibilities & preparations

Sea Notes pg. 8-1 to 8-12

Personnel safety & dangers

KMS pg. 372 to 381

Personnel approaching a helicopter

Helicopter operating conditions

Maneuvering your vessel

Shipboard hoisting & landing

Pilot use of helicopters

WEEK 14

SEARCH & RESCUE OPERATIONS

Source of SAR information & AMVER Sea. Notes pg. 9.1 to 9.15

SAR Planning

On scene coordination

Search Patterns

Terminating the Search

REVIEW FOR FINAL EXAM

This syllabus and course schedule is tentative and may be adjusted as required to meet the goals and objectives of the course. Notification of any changes will be made as soon as possible.

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Massachusetts Maritime Academy
Marine Transportation Department
MT 4132 ADVANCED SEAMANSHIP LAB
Fall 2022

Lab 1

Practice initial docking exercises in Monomoy to reinforce the need to proceed at bare steerage way. Each oar command (engine command) shall be well thought out and deliberate

Lab 2 and lab 3

Motor Whaleboat 1 and Motor Whaleboat 2 allows individuals two labs to practice undocking and docking skills with instruction and feedback. It is strongly recommended that cadets practice mwb skills outside of these designated lab hours. The goal is to develop the following skills:

1. Standard line handling commands properly executed
2. Effective approach angle to dock estimating effects of wind and current; using wind and current to advantage
3. Approaching dock at bare steerage way
4. Effective use of rudder and engine demonstrating control of the vessel
5. Demonstrate proactive not reactive planning
6. Demonstrate proper use of dock lines**safety note...plan undocking/docking so that no lines are handled under tension
7. Demonstrate the proper positioning of fendering when securing the vessels
8. Review mwb start up, operating and shutdown procedures
9. Examine the possibilities of aborting an approach and making recovery for second approach
10. Discuss, setup for and practice engine assisted turning
11. Demonstrate back and fill/turning in a confined space

Lab 4 Motor Whaleboats are used in the canal working against current. The goal is to develop the following skills:

1. Practice the stemming of a current to hold position
 2. Anticipate drift and make allowances in a strong current
 3. Learn to use uncontrollable forces to advantage
 4. Building shiphandling skills and confidence
 5. Learning to anticipate current deflection from nearby structures
 6. Learning the use of lines when docking and undocking in a strong current
- The above is accomplished by making landings and departures from alongside the heavily fendered tugs alongside the state pier

Lab 5 Tug lab- Develop the following skills.

1. Understand the fundamentals of docking and undocking a single screw left hand turning propeller
2. Understand the fundamentals of docking and undocking with twin screw inboard turning propellers

Lab 6 Towing alongside developing the following skills:

1. Understanding of pivot point
2. Obtain practical experience making up a tow "on the hip"

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3. Practice running the proper leads and tensioning of towing lines
4. Learning how to make up on h-bitts
5. Learning which side of the tow to make fast to
6. Learning about placement of tug alongside tow
7. Casting the tow
8. Using environmental to advantage

Lab 7 The manned models lab. Transportation /driver arrangements will be made for cadets. Due to the time limitations and number of students a simple exercise of negotiating a buoyed channel planning for advance and transfer will be conducted.

Lab 8 Make up for previous poor weather- If not needed practice eye splice 8 strand plaited line.

Lab 9 Motor whaleboat practical – This consists of undocking, back and fill, and docking

Lab 10 View immersion suit / hypothermia film

Immersion suit practical

1. Don immersion suits correctly
2. Leader emerges, muster taken
3. Enter water correctly
4. Get into the h.e.l.p. (heat elimination lessening position)
5. Huddle up...
 - A. Used to conserve heat
 - B. Injured person can be placed in center
6. Muster taken
7. Chain up...
 - A. Used to create a large target for aircraft
 - B. Used to move as a group
 - C. Injured person can ride on top
8. Chain backstrokes to liferaft
9. First person in raft assists others getting in
10. Muster taken
11. Maneuver l/r by oar and by tossing and retrieving sea anchor

Lab 11 Demonstration on the rigging of blocks and tackle. Mechanical advantage is determined. Force needed to lift object including friction is determined.

Equipment list:

1. Tape measure
2. Chain fall
3. 3 fold purchase for tackle on tackle demonstration...attach to vehicle hitch
4. Double luff tackle (3/2), for tackle on tackle demonstration...attach to gallows
5. 10ft long continuous rope sling used to attach load to gallows with quick release fid so that load can be quickly transferred to pendant...initially loads are lifted in place by chain fall and transferred to 10ft rope sling
6. Large wood fid
7. Fid trip line
8. 4ft long continuous rope sling for tackle on tackle demonstrations...used to attach purchase to bumper
9. 3ft long continuous rope sling for tackle on tackle demonstrations...used to attach purchase to gallows
10. 5ft long (eye to eye) 3/8" manila and 1/2" nylon pendants...construct pendants with nylon reinforcing eyes.

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11. Bucket of assorted large shackles
12. Step ladder
13. Worksheets for calculating % stretch
14. Tell tails

Lab 12 Review for marlinspike practical test. Question and Answer session

Lab 13 Marlinspike practical test. Proficiency in tying, whipping, and splicing as well as understanding the use of:

1. Whipping, temporary
2. Whipping, permanent
3. Overhand knot
4. Figure eight knot
5. Square knot
6. Single becket bend
7. Double becket bend
8. Bowline
9. Clove hitch
10. Round turn and 2 half hitches
11. Rolling hitch
12. French bowline
13. Bowline on a bight
14. Monkey fist
15. Timber hitch
16. Catspaw
17. Single blackwall hitch
18. Double blackwall hitch
19. Spanish bowline
20. Fisherman's knot
21. Fisherman's bend
22. Single carrick bend
23. Double carrick bend
24. 3 strand eye splice
25. 3 strand short splice
26. 3 strand back (tail) splice
27. 8 strand plaited eye splice
28. Spanish windlass
29. Mousing a hook
30. Siezing
31. Bos'n chair hitch
32. Staging hitch with horns
33. Staging hitch w/o horns .
34. Single part standard stopper hitch
35. Chinese stopper

Knowledge of:

1. Parts of a wooden block
2. Block size in relation to manila rope

3. Problem solving...

- mechanical advantage
- lifting force required (with and without friction)

4. Breaking strength of manila calculation

5. Safe working load calculation

6. Use of a safety factor

Demonstrate the reeving of:

1. Runner
2. Single whip
3. Double whip
4. Gun tackle
5. Single luff tackle
6. Double luff tackle
7. Two fold purchase
8. Three fold purchase
9. Tackle on tackle