

METEOROLOGY

MT-3131 Fall 2024



COURSE

Meteorology – MT-3131

CREDITS

3 / 50m Lectures, 3 per week

COURSE INFORMATION

Description: This course gives a basic understanding of meteorology, and its application to shipboard operations. The student will have a knowledge of meteorological instruments and their application, knowledge of the characteristics of various weather systems, reporting procedures and recording systems, and the ability to apply the meteorological information available. Students will complete a practical application of reading and interpreting weather charts and demonstrate the ability to forecast future weather events. In addition, the knowledge gained in this subject will serve as the basis for further training for a Management Level credential.

Prerequisites: Radar Observer Certification (RADAR) (MT-3122)

COURSE OBJECTIVES

After completing this course, students should:

- Be more comfortable with weather concepts, be more interested in the weather, and better appreciate the weather.
- Fully understand how the atmosphere interacts and produces weather
- Appreciate the difference between weather and climate
- Be able to determine true wind from a moving vessel
- Know how to interpret weather charts, satellite images and text information to assess present and future weather conditions
- Fully understand the characteristics of cloud types, weather fronts, sea heights, and fog conditions to assist in confirming validity of weather reports
- Have the knowledge necessary to successfully pass the Meteorology section of the Navigation General portion of a US Coast Guard MMC License Exam.

STCW Knowledge-Based Learning Objectives:

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

- OICNW-A1.09-Ability to use and interpret information obtained from shipborne meteorological instruments
- OICNW-A1.10-Knowledge of the characteristics of the various weather systems
- OICNW-A1.10-Weather system reporting procedures and recording systems
- OICNW-A1.11-Ability to apply the meteorological information available

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

COURSE OUTCOMES

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

- Demonstrate the knowledge necessary to stand an effective navigation watch interpreting the weather to ensure safety of the vessel, her personnel and cargo during the voyage
- Show a familiarity with how to interpret weather charts and images for upper level air, surface and wind /wave conditions both at present and future locations along a track route
- Display an understanding of accurate weather determination and reporting principals
- Exhibit a comprehension of the basic causes and effects of the weather
- Demonstrate an understanding of the characteristics and effects of various weather elements such as pressure systems, air masses, fronts, storms, precipitation, fog, and clouds
- Display an understanding of tropical storm avoidance

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

ATTENDANCE

Regular attendance is expected and is a key to success in the course. Since this is an STCW course, no allowance for unexcused absence will be made. Students are required to attend their scheduled lecture.

- More than three (3) absences from lectures for *ANY* reason will result in a failing grade for the course, or at least a reduction of the final grade for the course by one full letter grade.
- Any unauthorized absence will result in a cadet being placed on report and subject to disciplinary action.
- It is the individual student's duty to keep up with the material, and to arrange to make up any tests, examinations or material missed ***in advance*** or a zero will be recorded for that work.

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 Cadets shall wear the appropriate uniform of the day to each class.
- All content, notifications, resources, and any other materials will be posted and available on Blackboard via the student's assigned lecture section.
- Class discussion is a crucial component of this course. All members of this class, including the instructor, will grant others respect, even when discussing challenging subjects. In this course, the aim of our inquiries is critical understanding, even while topics may be controversial. You will be expected to participate in class discussions while demonstrating maturity and civility.
- This class may use video and audio recordings of faculty and students, both online and in person, to better support learning. By enrolling and participating in this course, you are consenting to being recorded while in class, and may only withdraw such consent by informing the instructor in writing. As these recordings may contain intellectual property as well as confidential student information (i.e. student names, likenesses), students may not share or transfer any recordings of such content by any method. Copies of such recordings cannot be provided to others; nor should they be uploaded, linked, embedded, or otherwise posted via file-sharing, social media, or other sites that could enable other non-enrolled individuals to view them. Access to class video and audio recordings is for personal educational use only and is available only to individuals currently enrolled in the class, unless faculty permission is expressly granted. Recording and/or sharing course content without the written consent of the course instructor is a violation of the MMA Honor Code.
- The MMA honor code will be strictly followed during the course of the semester. The code states that cadets do not "lie, cheat, or steal." This code applies to the Regiment as well as Academics. Any submitted work be that examinations, tests, quizzes, 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 group projects. If an instructor has any concern about a possible violation of the MMA Honor Code, or if you

cheat on a quiz, test, exam, or copy someone else's work and turn it in as your own, or turn in the same assignment you completed for another course, or violate the Honor Code in any other way, you will receive a grade of zero and the instance may be pursued with the honor Board via the Commandant of Cadets after referral to the Vice President of Academic Affairs. In serious cases, violations of the Honor Code may result in suspension or expulsion from the Academy. So don't cheat—ultimately, it's not worth it!

- All work submitted for this course must be your own. Any use of generative AI tools, such as ChatGPT, when working on assignments is forbidden. Use of generative AI will be considered a violation of the Honor Code. The assignments in this class have been designed to challenge you to develop creativity, critical-thinking, and problem-solving skills. Using AI technology will limit your capacity to develop these skills and to meet the learning goals of this course. If you have any questions about the use of AI in this course or what constitutes AI, please contact Library Services for their guide to AI, or contact me to discuss your concerns.
- Laptops are allowed in class to take notes and follow slide decks. However, any use of laptops for other than class-related activities is prohibited and will result in the rescission of the privilege of laptop use during class periods. 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
- Cell phone use in class for any reason is prohibited except when given approval by the instructor. 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 or lab 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. Use of smart phone calculators is not permitted.
- Unless allowed by an academic accommodation, earbuds are not to be used during class.
- Only covered drinks will be permitted in the classroom.

REQUIRED COURSE MATERIALS AND EQUIPMENT:

- Pad of Maneuvering Board Plotting Sheets – available from nautical publication on line vendors
- Plotting Gear: Triangles or Parallel Ruler, and Dividers.
- Additional Materials as noted in class, in slide decks, or as posted on Blackboard

SUGGESTED TEXT BOOK

- *Understanding Weather and Climate*, 7th ed. (or 6th ed.), Aguado and Burt, 2015 (WC)
- *The American Practical Navigator - Pub 9*, 2017 ed., Bowditch (B)

ADDITIONAL MATERIALS

The following web pages will be of interest:

National Oceanic and Atmospheric Administration www.noaa.gov/

National weather service www.nws.noaa.gov

Ocean prediction center ocean.weather.gov

National Hurricane center www.nhc.noaa.gov

Weather channel www.weather.com

Weather Underground <https://www.wunderground.com/>

UK Meteorology Office www.metoffice.gov.uk

REFERENCES

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

INCLUSION AND ACADEMIC ACCOMMODATIONS

- MMA welcomes students of all backgrounds, identities, and abilities, and is committed to fostering a learning community in which all students are treated with respect and civility. Students are encouraged to share their unique perspectives while remaining open to the views of others and appreciating the opportunity to learn from one another. The Academy is committed to inclusivity, diversity, and equity, and believes that all students, no matter their race, gender, sexual orientation, religious beliefs, abilities, nationality, or economic status, have the right to access the resources they need to achieve their educational and professional goals.
- Title IX prohibits all forms of gender-based discrimination, including sexual assault and harassment, in educational programs that receive federal funding. Title IX reads, “[N]o person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving federal financial assistance.” If you have been subjected to discrimination, harassment, or assault, please contact Title IX coordinator Lauren Salem (lsalem@maritime.edu, x5148), or Elizabeth Benway, Dean of Human Resources (ebenway@maritime.edu, x5086). You may also want to file a report with MMA Police (x5060) or the local police (dial 911) regarding assault.
- The Family Education Rights and Privacy Act (FERPA) is a federal law designated to protect the privacy of a student’s records and academic work. All files, records, and academic work completed within this course (or as related to this course, like tutoring)

are considered educational records and are protected under FERPA. This means that faculty members cannot share information about your performance in this course or any other course with anyone, including your parents/guardians, unless you expressly name and grant written permission for them to have access to that information.

- Massachusetts Maritime Academy is committed to providing academic accommodations to students who qualify. Students who had an IEP or 504 Plan in high school, or others who believe they may need and qualify for accommodations in this class are encouraged to contact Dr. S. Elaine Craghead, Assistant Dean and Academic Accessibility Services Coordinator, ideally within the first two weeks of class. Please remember that academic accommodations are not retroactive. Dr. Craghead can be contacted at ADAcompliance@maritime.edu or at x5350.
- If you are experiencing anxiety, depression, alcohol or drug concerns, difficulty concentrating, or other mental health issues, please contact Jennifer Levesque in Counseling Services at jlevesque@maritime.edu, or at x5180.

GRADING POLICY

- It is planned that approximately five (5) unit tests will be administered during lecture meetings. Tests will be announced and given during a full lecture period and last 50 minutes.
- The final week of the semester will include a synoptic weather interpretation, analysis, and prediction test. This test involves a practical application of many of the concepts covered in the course.
- 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.
- Examinations will cover class materials.
- 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.

Class grade will be determined based on the following:

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|-------------------------------------|-----|---------------------------------------|-----|
| • Examinations, tests, and quizzes: | 55% | • Assignments | 15% |
| • Practical Application Test | 10% | • Class Participation and Attendance: | 5% |
| • Final Examination: | 15% | | |

Final Course Grading:

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

COMMUNICATIONS AND ANNOUNCEMENTS:

Primary contact with the instructor is email (jbelle@maritime.edu). Response can be expected within 24 hours, often quicker.

Notifications will also be sent to students via Blackboard. Blackboard will not be monitored for responses.

Students must check email and Blackboard daily for course information.

WEATHER REPORTING

- Each student is responsible for a daily weather brief. The weather for Buzzards Bay and the location noted in the Lesson Plan for that day shall be briefed each class by a chosen cadet. Students may be called upon multiple times during the semester.
- A second chosen cadet will be asked to confirm the accuracy of the weather report each day.
- Verbal weather reports and confirmations will be graded by the instructor and become 25% of the Assignment portion of each student's grade.
- The report must include (except Coastal and High Seas areas):
 - Temperature High & Low (° C)
 - Pressure in mb
 - Dew Point (° C)
 - Relative Humidity (%)
 - Wind Direction
 - Wind speed (knots, not MPH)
 - Cloud Type, % and Visibility (for Buzzards Bay only)
 - Precipitation type and amount expected (if applicable)
- The two students called on for the day shall give a written report of the weather briefing including citation to the instructor. A blank weather report form is available on Blackboard

INDEPENDENT INTERNET RESEARCH PROJECT

- Each student will be required to submit a written Internet research project on an element of weather found on the **National Oceanic and Atmospheric Administration** www.noaa.gov/ website
- Projects are due on or before the beginning of class November 25, 2024. A 10% reduction of the project grade will result for each day it is late including weekends and holidays.
- Papers shall be uploaded to Blackboard in the Assignments area under the Internet Research Project assignment. Alternatively, a hard copy of the paper can be submitted in person to the instructor.
- The project comprises 25% of the Assignment portion of each student's grade.
- Further details on this project can be found on the course Blackboard page or by asking the Instructor.

GRADED HOMEWORK ASSIGNMENTS

- Two graded homework exercises are planned.
- Each of these assignments make up 25% of the assignments portion of each student's grade.
- Exercises will be posted on Blackboard and become available once the associated material is covered in class.
- Exercises shall be uploaded and "submitted" to Blackboard in the Assignments area by the due date. They will not be accepted late. Alternatively, a hard copy of the paper can be submitted in person to the instructor.

INSTRUCTOR

CDR John Belle jbelle@maritime.edu

Office HA320A. (*third deck of Harrington Hall*). Come visit any time!

Student Hours: Mon. 1100-1150, Fri .0900-1050, and by appointment

Primary contact by email. Will usually respond within 24 hours, often quicker

My duty is to:

- Arrive on time, prepared for class,
- maintain student hours,
- guide you through the material,
- answer all your questions, e-mails, texts, etc., usually within 24 hours
- be available should you need further explanation,
- promptly return and comment on assignments, quizzes and tests,
- inform students of changes to the syllabus, and
- treat all students with respect.

It is your responsibility to:

- Arrive to class on time or early prepared to discuss the subject matter for that day,
- actively participate in classroom discussions, breakout sessions, and exercises,
- stop the instructor at any point that you don't understand as we will be glad to go over anything again,
- dedicate the time necessary to learn and become competent in the course material,
- make use of all the resources available to students MMA to achieve academic success,
- follow course policies, and
- treat your fellow students and the instructor with respect.

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

It is my 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 me or stop by my office for extra help. I will be available for as long as it takes to help you. Further, I will make every attempt to respond to any email inquiries within 24 hours not matter when they are received.

LESSON PLAN / READING ASSIGNMENTS / WEATHER REPORTS / TESTS:

1. **Course Introduction & Policies**
Basics – W/C 25-27(22-25)
2. **Why Study Weather? - Meteorology vs. Climate**
W/C 27-28; 2-10, 447-477 (25-26, 2-8, 441-461)
Valdez, Alaska
PKZ126: Port Valdez
3. **The Atmosphere**
W/C 10-24 (6-22)
Seattle, WA
PKZ125: Prince William Sound
4. **Unequal Heating of the Earth, The Seasons**
W/C 32-51 (30-51)
Long Beach, CA
PZZ131: Central US Waters, Strait of Juan De Fuca
5. **Temperature and Energy Balance**
W/C 54-85 (54-89)
Valparaiso, Chile
PZZ 270: Waters from Cape Shoal Water to Cascade, OR
6. **TEST 1**
All lecture and reading material to date
7. **Moisture in the Atmosphere**
W/C 120-146 (122-146)
Buenos Aires, Argentina
PZZ531: San Francisco Bay south of the Bay Bridge
8. **Condensation / Fog**
W/C 146-155 (146-154)
Rio de Janeiro, Brazil
PZZ650: East Santa Barbara Channel from Point Conception to Point Mugu, CA
9. **Cloud Formation**
W/C 160-174 (158-172)
Cristobal, Panama
PHZ115: Oahu Leeward Waters

10. **Cloud Types**
W/C 175-187 (172-185); Guide at End of Text (Same)
Galveston, TX
GMZ335: Galveston Bay
11. **Precipitation**
W/C 190-211 (190-209)
Charleston, SC
GMZ470: Waters from Cameron, LA to High Island, TX
12. **TEST 2**
All lecture and reading material to date
13. **Atmospheric Pressure**
W/C 90-104 (92-106)
St. Johns, New Brunswick
GMZ572: Coastal Waters from Southwest Pass to the Mississippi River to Port Fouchon, LA
14. **Wind**
W/C 105-116 (106-117)
Reykjavik, Iceland
GMZ830: Tampa Bay Waters
15. **Measuring Wind – True vs. Relative / Beaufort Scale**
W/C 116 (116), Lecture Slides, Handout, B Art. 3610-3612
Stockholm, Sweden
GMZ054: Strait of Florida from west end of Seven Miles Bridge to south of Halfmoon Shoal
16. **Measuring Wind – True vs. Relative / Beaufort Scale**
W/C 116 (116), Lecture Slides, Handout, B Art. 3610-3612
17. **Waves and Swells**
B art. 3700-3214
Rotterdam, Netherlands
AMZ712: Coastal Waters of Northern Puerto Rico

18. **Earth's Circulation**
W/C 214-257 (212-254)
Gibraltar
AMZ450: Coastal Waters from Altamaha Sound to Fernandia Beach, FL
19. **Permanent Winds**
B art., 3800-3807
Valencia, Spain
AMZ330: Charleston Harbor
20. **Ocean Currents and Local / Regional Winds**
B Art. 3600-3609, 3808 & 3814
Livorno, Italy
AMZ174: Waters from Cape Hatteras to Ocracoke Inlet, NC
21. **TEST 3**
All lecture and reading material to date
22. **Air Masses**
W/C 262-268 (258-265)
Odessa, Ukraine
ANZ534: Chesapeake Bay from Drum Point, MD to Smith Point, VA
23. **Weather Fronts**
W/C 268-282 (265-275)
Malta
ANZ454: Coastal Waters from Cape May, NJ to Ferwick Island, DE
24. **Mid-Latitude Cyclones**
W/C 286-310 (280-303), B Art. 3811-3813
Port Said, Egypt
ANZ272: Ocean Waters from Martha's Vineyard to Nantucket
25. **Mid-Latitude Cyclones**
W/C 286-310 (280-303), B Art. 3811-3813
Djibouti, Djibouti
ANZ234: Buzzards Bay
26. **TEST 4**
All lecture and reading material to date

27. **Thunder, Lightning, Tornadoes**
W/C 314-351 (306-340) B Art. 3815, 3825
Cape Town, South Africa
ANZ250: Coastal Waters east of Ipswich Bay and the Stellwagen Bank National Marine Sanctuary
28. **Tropical Storms**
W/C 354-387 (345-375) B Art. 3900-3908
Mombasa, Kenya
ANZ900: Georges Bank
29. **Hurricane Avoidance**
B art. 3508-3511 and lecture slides
Dubai, United Arab Emirates
ANZ930: Hatteras Canyon
30. **Hurricane Avoidance**
B Art. 3508-3511 and lecture slides
31. **TEST 5**
All lecture and reading material to date
32. **Weather Images, Satellites, Doppler**
W/C 415-416 (407-411), NOAA Website
Mumbai, India
ANZ119: Atlantic east of Bahamas
33. **VOS & Weather Routing**
B 4100-4111, Lecture Slides
W/C 390-408 (380-398)
Singapore
GMZ019: Central Gulf
34. **Forecasting**
W/C 390-408 (380-398), B Art. 3826-3828
Busan, South Korea
PKZ413: Bering Sea Offshore
35. **Weather Maps**
W/C 409-414 (398-407)
Manilla, Philippines
PZZ940: Santa Cruz Island, CA

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| 36. | Practical Exam Introduction
<i>Class Materials</i>
<i>Melbourne, Australia</i>
<i>PZZ800: Cape Fattery to Cape Shoalwater</i> |
| 37. | Practical Exam Practice |
| 38. | Practical Examination |
| 39. | Practical Examination Review |
| 40. | Course Review |
| Final Exam Week | FINAL EXAMINATION
<i>All lecture and reading materials</i> |

SYLLABUS CHANGES:

This syllabus is intended to guide students in what may be covered during the semester, and will be followed as closely as possible. However, the syllabus may be modified, supplemented, or otherwise changed as course/instructor needs arise. Notice of changes will be made to students as soon as possible.