

# METEOROLOGY

## MT-3131 Fall 2015

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### COURSE

Meteorology

### CREDITS

3 / 42 - 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 assessment 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 to the level of Chief Mate and Master.

**Prerequisites:** College Physics 1 (SM-2121) or Engineering Physics 1 (SM-2123)

### 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

### STCW Practical Element Learning Objective:

**Completion of this course will demonstrate proficiency in the following skills:**

- OICNW 1-7C: Determine expected weather conditions
  - Ability to use and interpret information obtained from shipborne meteorological instruments
  - Using surface, upper air and sea state analysis weather maps, the cadet shall determine the weather (expected wind, sea and weather conditions) to be encountered during the next 24-hour period.

### COURSE OBJECTIVES

After completing this course, students should:

- 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 and what course to steer to achieve a desired relative wind
- 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 the USCG License Exam

# METEOROLOGY

## MT-3131 Fall 2015

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### 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.

### 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.
- The MMA honor code will be strictly followed. **Cheating will not be tolerated.** Anyone found cheating on a test or an assignment will be given a zero for that test/assignment and placed on report to the Commandant of Midshipmen.
- Cell phone texting or calls are not permitted during class. Cell phones **shall** be put away, in your bag or pocket at the beginning of class and remain away until the end of class, unless specifically directed otherwise by the instructor. *First offence of this policy will result in an order to deliver your cell phone to the Dean. Each offense thereafter will result in a reduction of your overall grade by one letter grade.* Use of smart phone calculators is not permitted.
- Laptop computers are permitted in the classroom. However, if Internet surfing or use of social media is detected during class periods, laptop computer use privileges will be suspended.

### ATTENDANCE

Regular attendance is expected and is a key to success in the course.

- 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.

Mass Maritime Academy is committed to providing reasonable accommodations to students with documented disabilities. Students who believe that they may need accommodations in this class are required to contact Professor Fran Tishkevich , Director of Disability Compliance.

[ftishkevich@maritime.edu](mailto:ftishkevich@maritime.edu) MMA Tel. ext. 2208 Room H-311A (Harrington Building).

Thereafter, you must make me aware of any determined accommodations so that they may be implemented within our classroom.

# METEOROLOGY

## MT-3131 Fall 2015

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### GRADING POLICY

- It is planned that seven (7) unit tests will be administered during lecture meetings. Tests will be announced and given during a full lecture period and last 50 minutes.
- 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 except STCW practical assessment material.
- 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 **as well as** material from assigned reading **even if not discussed in class**.
- 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.**
- The course includes an STCW Practical Assessment in synoptic weather interpretation, analysis, and prediction. Students must pass this assessment examination **with 80% accuracy** to receive STCW practical certification and pass the course. Each cadet will have two chances to achieve the 80% synoptic proficiency; **however the grade on the first proficiency exam will count toward overall academic grade.**

### Class grade will be determined based on the following:

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|--|---------------------------|
| • Class Participation and Attendance: 5% | • STCW Practical Exam 15% |
| • Examinations, tests, and quizzes: 50%  | • Final Examination: 20%  |
| • Assignments 10%                        |                           |

### 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

### WEATHER REPORTING

- Each student is responsible for a daily weather brief. The weather for Buzzards Bay and the location noted in Lesson Plan for that day shall be briefed each class by a chosen cadet.
- The report must include (except Coastal and High Seas areas):
  - Temperature High & Low (° F)
  - Pressure in MB
  - Dew Point (° F)
  - Relative Humidity (%)
  - Wind Direction
  - Wind speed (knots, not MPH)
  - Cloud Type, % and Visibility (for Buzzards Bay only)
  - Precipitation type and amount expected (if applicable)
- A written report of the weather briefing including citation to sources must be submitted at the end of class in order to receive full credit.
- A second chosen cadet will be asked to confirm the accuracy of the weather report each day.
- Weather reports and confirmations will be graded by the instructor and become part of the Assignment portion of each student's grade.

# METEOROLOGY

## MT-3131 Fall 2015

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### TEXT MATERIALS

*Understanding Weather and Climate*, 7<sup>th</sup> ed., Aguado and Burt, 2015 (W/C)

(If using 6<sup>th</sup> ed., reading assignment pages in parentheses)

*The American Practical Navigator - Pub 9*, 2002 ed., Bowditch (B)

Additional Materials as noted in class, in slide decks or as posted on Blackboard

The following web pages will be of interest:

National weather service [www.nws.noaa.gov](http://www.nws.noaa.gov)

Internet weather source [www.weather.noaa.gov](http://www.weather.noaa.gov)

Ocean prediction center [www.opc.necp.gov](http://www.opc.necp.gov)

National Hurricane center [www.nhc.noaa.gov](http://www.nhc.noaa.gov)

Ocean Weather Inc. [www.oceanweather.com](http://www.oceanweather.com)

UK Meteorology Office [www.metoffice.gov.uk](http://www.metoffice.gov.uk)

Weather channel [www.weather.com](http://www.weather.com)

### REFERENCES

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

### INSTRUCTOR

LDCR John Belle Office # 322A [jbelle@maritime.edu](mailto:jbelle@maritime.edu)

Office Hours: Wed. 1300-1350, Thurs. & Fri. 1100-1150 or **any other time by appointment.**

### My 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
- Be familiar with all assigned material even if not discussed in class.

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.

# METEOROLOGY

## MT-3131 Fall 2015

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### LESSON PLAN / READING ASSIGNMENTS / WEATHER REPORTS / TESTS:

1. 9/2 Course Introduction & Policies - Why study Weather?  
*Basics – W/C 25-27(22-25)*
2. 9/4 History, Meteorology vs. Climate  
*W/C 27-28; 2-10, 447-477 (25-26, 2-8, 441-461)*  
*Valdez, Alaska*
3. 9/9 The Atmosphere  
*W/C 10-24 (6-22)*  
*Seattle, WA*
4. 9/11 Unequal Heating of the Earth, The Seasons  
*W/C 32-51 (30-51)*  
*Long Beach, CA*
5. 9/14 Temperature and Energy Balance  
*W/C 54-85 (54-89)*  
*Valparaiso, Chile*
6. 9/16 TEST 1  
*All lecture and reading material to date*
7. 9/18 Moisture in the Atmosphere  
*W/C 120-146 (122-146)*  
*Buenos Ares, Argentina*
8. 9/21 Condensation / Fog  
*W/C 146-155 (146-154)*  
*Rio de Janeiro, Brazil*
9. 9/23 Cloud Formation  
*W/C 160-174 (158-172)*  
*Cristobal, Panama*
10. 9/25 Cloud Types  
*W/C 175-187 (172-185); Guide at End of Text (Same)*  
*Galveston, TX*
11. 9/28 Precipitation  
*W/C 190-211 (190-209)*  
*Norfolk, VA*
12. 9/30 TEST 2  
*All lecture and reading material to date*

# METEOROLOGY

## MT-3131 Fall 2015

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| 13. | 10/2  | Atmospheric Pressure<br><i>W/C 90-104 (92-106)</i><br><i>St. Johns, New Brunswick</i>  |
| 14. | 10/5  | Wind<br><i>W/C 105-116 (106-117)</i><br><i>Reykjavik, Iceland</i>  |
| 15. | 10/7  | Measuring Wind – True vs. Relative / Beaufort Scale<br><i>W/C 116 (116), Lecture Slides, Handout, B Art. 3610-3612</i><br><i>Stockholm, Sweden</i> |
| 16. | 10/9  | Waves and Swells<br><i>B art. 3200-3213</i><br><i>Rotterdam, Netherlands</i>   |
| 17. | 10/13 | TEST 3<br><i>All lecture and reading material to date</i>  |
| 18. | 10/14 | Earth's Circulation<br><i>W/C 214-257 (212-254)</i><br><i>Gibraltar</i>  |
| 19. | 10/16 | Permanent Winds / Ocean Currents<br><i>B art. 3402-3408, 3104-3113</i><br><i>Cape Town, South Africa</i>   |
| 20. | 10/19 | Local / Regional Winds and Monsoons<br><i>B Art. 3408 &amp; 3412</i><br><i>Port Said, Egypt</i>  |
| 21. | 10/21 | TEST 4<br><i>All lecture and reading material to date</i>  |
| 22. | 10/23 | Air Masses<br><i>W/C 262-268 (258-265)</i><br><i>Valencia, Spain</i>   |
| 23. | 10/26 | Fronts<br><i>W/C 268-282 (265-275)</i><br><i>Odessa, Russia</i>  |
| 24. | 10/28 | TEST 5<br><i>All lecture and reading material to date</i>  |
| 25. | 10/30 | Mid-Latitude Cyclones<br><i>W/C 286-310 (280-303)</i><br><i>Dubai, United Arab Emirates</i>  |

# METEOROLOGY

## MT-3131 Fall 2015

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26. 11/2 Thunder, Lightning, Tornadoes  
*W/C 314-351 (306-340)*  
*Mumbai, India*
27. 11/4 Tropical Storms  
*W/C 354-387 (345-375)*  
*Singapore*
28. 11/6 Hurricane Avoidance  
*B art. 3508-3511*  
*Melbourne, Australia*
29. 11/9 TEST 6  
*All lecture and reading material to date*
30. 11/11 Forecasting  
*W/C 390-408 (380-398)*  
*Shanghai, China*
31. 11/13 Weather Maps  
*W/C 409-414 (398-407), Handout*  
*Adak, Alaska*
32. 11/16 Weather Images  
*W/C 415-416 (407-411)*  
*Atlantic High Seas*
33. 11/18 VOS  
*Lecture Slides*  
*Wilmington, NC East Coast Coastal*
34. 11/20 Satellites, Buoys & Doppler  
*NOAA Website*  
*New Orleans, LA Gulf Coast Coastal*
35. 11/23 TEST 7  
*All lecture and reading material to date*
36. 11/30 Optics  
*W/C 517-523 (505-513), B art. 3416-3422*  
*Pacific High Seas*
37. 12/2 Climate Change  
*W/C 477-511 (465-499)*  
*San Francisco, CA West Coast Coastal*

# METEOROLOGY

## MT-3131 Fall 2015

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38.	12/4	Assessment Practice Review <i>Class Materials</i> <i>Anchorage, AK Coastal and Offshore</i>
39.	12/7	STCW Assessment Examination
40.	12/9	Assessment Review
41.	12/11	Re-Assessment
42.	TBD	FINAL EXAMINATION <i>All lecture and reading materials except STCW Assessment</i>

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.