UMBC UGC New Course Request: NAVY 201 Navigation

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	Name	Email	Phone	Dept
Dept Chair or UPD	Troy Mong	tmong@umbc.edu	Ext. 5-8035	NAVY
Other Contact	Stew Wennersten	swenners@umbc.edu	Ext. 5-8035	NAVY

COURSE INFORMATION:

Course Number(s)	NAVY 201
Formal Title	Navigation
Transcript Title (≤30c)	Navigation
Recommended Course Preparation	None
Prerequisite **NOTE:** Unless otherwise indicated, a prerequisite is assumed to be passed with a "D" or better.	Permission by the Professor of Naval Science
Credits	3
Repeatable?	☐ Yes ☒ No
Max. Total Credits	3 This should be equal to the number of credits for courses that cannot be repeated for credit. For courses that may be repeated for credit, enter the maximum total number of credits a student can receive from this course. E.g., enter 6 credits for a 3 credit course that may be taken a second time for credit, but not for a third time. Please note that this does NOT refer to how many times a class may be retaken for a higher grade.
Grading Method(s)	☒ Reg (A-F) ☐ Audit ☐ Pass-Fail

PROPOSED CATALOG DESCRIPTION (no longer than 75 words**):**

This course introduces the student to a broad yet thorough education in basic surface ship navigation. Curriculum presents an overview of tools of the modern naval watch officer, and topics include celestial navigation, rules of the nautical road, piloting, practical chartwork, tides, instruments, publications, records, and electronic navigation systems. Instructional sessions and/or activities develop the maritime proficiency core competency of the Naval Reserve Officer Training Corps (NROTC) program.

RATIONALE FOR NEW COURSE:

a) **Why is there a need for this course at this time?** For students to be successful U.S. Navy officers, basic shipboard navigation skills develop the critical foundation for future professional studies. The Navy and Marine Corps are charged with maintaining superiority in the maritime domain, and marine navigation underpins every mission defense assets perform. The course will consist of 1.25 hours of instruction and practical assessments twice each week. NAVY 201 provides an in-depth study of the theory, principles, procedures, and application of plotting, piloting, and electronic navigation, as well as an introduction to maneuvering boards. Students learn piloting techniques, the use of charts, the use of visual and electronic aids, and the theory of operation of both magnetic and gyrocompasses. Students develop practical skills in plotting and electronic navigation. Other topics include tides, currents, effects of wind/weather, voyage planning, and an application and introduction to the international/inland rules of navigation. The course is supplemented with a review/analysis of case studies involving moral/ethical/leadership issues pertaining to the concepts previously listed.

b) **How often is the course likely to be taught?** The course will be piloted in the Spring 2017 semester and the course will be taught every spring semester (once per Academic Year). Once approved, the course will be adopted into the NROTC program at UMBC as part of its Naval Science curriculum offerings.

c) **How does this course fit into your department's curriculum?** This course is designed to fulfill the U.S. Navy-mandated navigation requirement. The class is a foundational skills course for midshipmen/students focused on joining the NROTC program and commissioning as an officer in the U.S. Navy. Students will practice the maritime proficiency professional competency required to become a naval officer, and develop a basic understanding of navigation concepts that are core to the Navy such as plotting and piloting, weather, steering and sailing rules, and maneuvering board fundamentals. This course may include, but not be limited to, navigation incident case studies, piloting exercises, and maneuvering board practical examinations. In addition, the course will utilize a mission bridge simulator and immerse the students in structured learning experiences targeting learning objectives and teamwork competencies.

d) **What primary student population will the course serve**: This course is intended for NROTC scholarship students and those students who wish to join the NROTC program and commission as an officer in the U.S. Navy or Marine Corps. It is open to all enrolled UMBC students with approval by the Professor of Naval Science. This course is designed for midshipmen/students in their second year of academic study within the NROTC program, although other students may be accepted for attendance on a case-by-case basis.

e) **Why is the course offered at the level (ie.100, 200, 300, or 400 level) chosen?** This course is intended for NROTC scholarship students and those UMBC students seeking to join the NROTC unit who desire a commission in the U.S. Navy. It is offered at the 200 level with the intention, but not required, for participating students to have completed NAVY 100 (Introduction to Naval Science) and NAVY 101 (Seapower and Maritime Affairs) for background prior to this course. The four-year curriculum track for NROTC scholarship students is designed for enrollment of midshipmen/students to this course who are in their sophomore year of collegiate study. Course completion for students participating in NROTC on two- or three-year curriculum tracks will be accepted pending referral from NROTC Academic Advisors. NROTC scholarship students must complete the Navigation course prior to participating in the “First Class Midshipmen Cruise,” a month-long training program undertaken between the junior and senior years of college.

f) **Explain the appropriateness of the recommended course preparation(s) and prerequisites(s).** This class is one of the required naval science courses required for completion of the commissioning requirements for the NROTC scholarship, however, it is open to all UMBC students with permission from the Professor of Naval Science.

g) **Explain the reasoning behind the P/F or regular grading method.** Students are able to take a pass/fail course only after they have completed 30 or more credits. Because this class is a core course within the student’s Naval Science curriculum continuum, it should only be available as a course with a regular grading method.

h) **Provide a justification for the repeatability of the course.** The Navigation course will be offered once per academic year, dependent on the availability of classrooms and associated resources. It is a core course in the NROTC curriculum continuum, and must be completed with a grade of C or higher. Students may repeat the course only one time, consequent to academic review by the Professor of Naval Science.

ATTACH COURSE OUTLINE (mandatory):

NAVY 201 – SYLLABUS
NAVAL SCIENCE NAVIGATION

Spring 2017

Meeting Times: Monday / Wednesday or Tuesday / Thursday 0800 – 0915

Location/Time: TBD

Course Coordinators: CAPT Troy Mong
UC 116, 410-455-8035
tmong@umbc.edu

CDR Stew Wennersten
UC 116, 410-455-8035
swenners@umbc.edu

Office Hours: The coordinators' office door is open most of the time - feel free to drop in and visit. If no one is available, please arrange an appointment via email. When sending an email, always include your full name and course number in the subject line. Also, use your UMBC email account to ensure validity and delivery.

Fixed office hours for the Course Coordinators will be provided on the official syllabus for this class.

Resources: Texts, assigned readings and handouts, websites, and potential guest lecturers. Texts will be loaned to all NROTC students by the Department of Naval Science, and to all other UMBC students as available. The texts are the property of the U.S. Government. Students can highlight the texts, but should not write in the margins. The books must be returned at the end of the semester in usable condition. If the text is unavailable from the Department of Naval Science, students can either buy or rent the textbooks. Additionally, a copy of each text can be found in the UMBC Albin O. Kuhn Library. Mariner Skills Simulator (MSS) demonstration and exercise sheets will be distributed as required.

Texts:
1. Bowditch, Nathaniel. American Practical Navigator. (**Bowditch**)

2. COMNAVSURFLANT/COMNAVSURFPAC/COMNAVAIRPAC/COMNAVAIRLANT Instruction 3530.4C. (**NAVDORM**)

3. Cutler, Thomas J. Dutton's Navigation. 15th ed. Annapolis, MD: U.S. Naval Institute, 2004. (**Dutton's**)

4. Hobbs, Richard R. Marine Navigation. 4th ed. Annapolis, MD: U. S. Naval Institute, 1998. (**Hobbs**)

5. Hobbs, Richard R. Marine Navigation Workbook. 4th ed. Annapolis, MD: U. S. Naval Institute, 1998. (**Hobbs WB**)

6. Maneuvering Board Workbook. NAVPERS 93440-A. Bureau of Naval Personnel. (**MOBOARD**)

7. Stavridis, James and Girrier, Robert. Watch Officer's Guide. 15th ed. Annapolis, MD: U.S. Naval Institute, 2007. (**WOG**)

8. U.S. Department of Transportation: U.S. Coast Guard. Navigation Rules International-Inland. COMDTINST M16672.2D. Arcata, CA: Paradise Cay Publications Inc., 2011. (Available online at http://www.navcen.uscg.gov) (**COLREGS**)

Computers: Students are permitted to use computers during class for note-taking and other class-related work. All electronic media will be provided by the NROTC unit. Those using computers during class for work or communication not related to that class must leave the classroom for the remainder of the class period.

Blackboard Site: A Blackboard course site is set up for this course. Each student is expected to check the site throughout the semester as Blackboard will be the primary venue for outside classroom communications between the instructors and the students. Students may access the course site and support at https://blackboard.umbc.edu.

Course Description: NAVY 201 is designed to fulfill the U.S. Navy-mandated navigation requirement. The class is a foundational skills course for midshipmen/students focused on joining the NROTC program and commissioning as an officer in the U.S. Navy or Marine Corps. Students will practice the maritime proficiency professional competency required to become a naval officer, and develop a basic understanding of navigation concepts that are core to the Navy such as plotting and piloting, weather, steering and sailing rules, and maneuvering board fundamentals. This course may include, but not be limited to, navigation incident case studies, piloting exercises, and maneuvering board practical examinations. In addition, the course will utilize a Maritime Skills Simulator (MSS) mission bridge simulator and immerse the students in structured learning experiences targeting learning objectives and teamwork competencies; the MSS enables students to visualize abstract concepts and engages students in interactive learning. Installation of MSS is pending.

Prerequisites: Permission of the Professor of Naval Science.

Course Purpose: For students to be successful U.S. Navy officers, basic shipboard navigation skills develop the critical foundation for future professional studies. The Navy and Marine Corps are charged with maintaining superiority in the maritime domain, and marine navigation underpins every mission defense assets perform. The course will consist of 1.25 hours of instruction and practical assessments twice each week. NAVY 201 provides an in-depth study of the theory, principles, procedures, and application of plotting, piloting, and electronic navigation, as well as an introduction to maneuvering boards. Students learn piloting techniques, the use of charts, the use of visual and electronic aids, and the theory of operation of both magnetic and gyrocompasses. Students develop practical skills in plotting and electronic navigation. Other topics include tides, currents, effects of wind/weather, voyage planning, and an application and

introduction to the international/inland rules of navigation. The course is supplemented with a review/analysis of case studies involving moral/ethical/leadership issues pertaining to the concepts previously listed.

The purpose of this course is to help develop the Maritime Proficiency core competency:

I. MARITIME PROFICIENCY

A. Comprehend the theory and practice of navigation at sea.

1. Comprehend the longitude/time relationship
2. Demonstrate time conversion and time zone determination
3. Know the correct procedures to determine the time of sunrise and sunset.
4. Know the theory and use of electronic navigation systems, including:
    a. Basic principles of radar navigation.
    b. Operating principles of GPS and navigation chart datum.
5. Comprehend the uses of navigational datums and the various chart projections.
6. Know chart symbology particularly those symbols pertaining to hazards and dangers.
7. Know how to select the proper charts (both paper and electronic) and how to determine chart accuracy and reliability.
8. Apply correct plotting procedures when navigating in pilot water, including:
    a. Apply the six rules of dead reckoning in keeping a plot of ship movements.
    b. Comprehend the definitions of the terms: track, speed of advance, speed over ground, PIM, EP, LOP, and relative bearing.
    c. Know turn and danger bearings.
    d. Demonstrate the ability to plot and interpret fixes and running fixes.
9. Know the advantages, disadvantages, and applications of gyro and magnetic compasses.
    a. Apply terrestrial navigation methods to determine compass error.
    b. Apply magnetic variation to a given location.
    c. Know the concept of deviation and the use of the digital flux gate magnetic compass.
10. Know the capabilities and limitations of various instruments used in piloting to determine direction, speed, distance, and depth of water.
11. Know the essential publications and records used in navigation and comprehend their value.
12. Know the characteristics and application of various aids to navigation in piloting and comprehend their importance in safe navigation, including:
    a. buoyage systems – IALA
    b. lights/daymarkers
    c. radar beacons/markers
13. Apply correct procedures in planning and plotting approaches to harbors and anchorages.
14. Comprehend tidal action and know tide classifications and reference planes.

15. Demonstrate the ability to use the Current Triangle to find course made good, speed made good, set, drift and compensating course and speed to negate set and drift.

B. Know environmental weather factors affecting Naval operations.

C. Know the sources of environmental products/predictions/ forecasts available to Naval units underway.

D. Know the impact of hazardous weather conditions on surface and flight operations at sea.

E. Comprehend relative motion and demonstrate capability to solve problems associated with relative motion.

1. Comprehend the theory of relative motion as graphically displayed by the geographic and relative plot.

2. Comprehend the significance of bearing drift and apply bearing drift to determine relative motion.

3. Demonstrate the ability to compute target angle.

4. Comprehend the speed triangle and the relative plot associated with maneuvering board.

5. Demonstrate the use of the maneuvering board to accurately:

a. Determine the closet point of approach (CPA) and time of CPA of an approaching vessel.

b. Determine the true course and true speed of a maneuvering ship.

c. Determine course, speed, and time for proceeding to a new station or to intercept another vessel.

d. Determine an avoidance course of a given target.

F. Know the Rules of the Road preventing collisions at sea.

Course Learning Outcomes: By the end of this course, students will be able to:

- Know the roles and responsibilities of navigation members.
- Comprehend basic properties and uses of navigational charts, texts, manuals, and the global positioning system.
- Demonstrate plotting, voyage planning, maneuvering board fundamentals, and operation of magnetic and gyro compasses.
- Comprehend the identifying characteristics and uses of visual navigation aids, navigation equipment, tides and currents, naval ship's tactical characteristics, and the principles of weather.
- Comprehend the responsibility of Naval Officers to ensure the safety of their ships and crews.

COURSE STRUCTURE

This is an introductory course instructed by a Department of Naval Science faculty member. Each week, students and faculty will meet Monday / Wednesday or Tuesday / Thursday 0800 – 0915. Course activities include the following:

- Homework/Chart Exercises/Quizzes/Class Participation/Attendance (30%). There will be announced and unannounced quizzes over the course of the Semester. Students are expected to **read** and **study** any handouts provided ahead of class (motivated by **quizzes**).

This will enable the students to comprehend the topics covered during the week and to be prepared for class. Additionally, there will be written responses (to be completed on Blackboard) to assigned readings throughout the semester. Students will also participate in chart exercises to demonstrate comprehension of fundamental navigation principles, such as plotting and the nautical slide rule. Maneuvering Board problems are assigned after associated lessons. Do not be lulled into a false sense of security because the answers are contained in the book. Students should complete applicable assignments after each lesson to ensure complete understanding of the material - all concepts are related. With respect to homework, effort displayed has relevance, but accuracy counts more. There is little margin of error when conducting stationing problems at sea, and these problems represent actual shiphandling evolutions. Participation is both quantitative and qualitative. Unexcused absences, tardiness, and lack of class preparedness will result in the reduction of this grade (2% per absence, 1% per tardiness).

- Examinations (70%). All exams will include True-False and multiple choice questions along with scenario-driven essay questions. The student's familiarity with course material, as well as its application to a real-world situation will determine the exam's grade.

GRADING AND EVALUATION

Letter grades will be assigned on a straight 90+ = A, 80+ = B, etc. basis. There is no curving; the grade is a reflection of how much students learned, not how much more or less they learned when compared to other students.

EVALUATION	% of GRADE
Homework / Chart Exercises	15
Quizzes	10
Class Participation / Attendance	5
Marine Navigation Exam (1)	20
Electronic Navigation / Rules of the Road Exam (2)	20
Final Exam (3)	30
TOTAL	100

COURSE POLICIES

Classroom Conduct: This seminar will be commensurate with a sophomore-level course. The Instructor acts as a facilitator to ensure discussions remain pertinent to the subject matter and that the interaction among students remains on a professional level. Thorough preparation and participation are critical to success, but so are demonstrated respect and consideration for your classmates' views and opinions. Inappropriate behavior or conduct will not be tolerated and can result in dismissal from the course.

Apart from the military courtesies extended to the instructor by the NROTC students, the classroom behavior of all students should be "collegiate," courteous, and respectful. Students are free to interject and question, even without waiting for direct recognition from the instructor (i.e. raising hand and being called upon), so long as the interjection is not unduly disruptive. Both students and the instructor will "police" classroom behavior.

Respect the viewpoints of others. Discussions of controversial subject matter will arise in class. Your candid opinions are required to meet seminar objectives. However, remarks intended to

offend classmates, or slurs that target race or religion will not be tolerated. And while students are encouraged to have "thick skins" regarding the viewpoints of others, when remarks create a hostile classroom environment the dialogue suffers. A simple standard will be applied to controversial remarks: Was the intent of the remark to heighten the dialogue?

Any views expressed by the instructor, unless specifically attributed otherwise, should be considered the personal views of the instructor and may not be representative of any official policy or viewpoint of the government, U.S. Naval Services or UMBC.

Honor Code: "A midshipman does not lie, cheat, or steal, nor tolerate those who do." All students are responsible for knowing and adhering to the academic integrity policy of this institution. Violations of this policy may include: cheating, plagiarism, aid of academic dishonesty, fabrication, lying, bribery, and threatening behavior. Students who are found to be in violation of the academic integrity policy will be subject to both academic sanctions from the faculty member and non-academic sanctions (including but not limited to university probation, suspension, or expulsion).

Attendance: Your presence at every class session, including discussion sections, is mandatory and expected. Unusual circumstances will be handled on a case-by-case basis. Absences are to be arranged with the Instructor prior to the class session. Subsequent make-up work will be assigned accordingly. If you need to miss class due to illness, or are otherwise unexpectedly detained, you must notify your class leader no later than 15 minutes prior to the beginning of class. An "excused" absence is at the sole discretion of the Instructor. Unauthorized absences will negatively affect your grade.

COURSE SCHEDULE

The following is a tentative timeline and is subject to change.

Lesson	Date	Topic	Item Due
Section I: Marine Navigation			
1		**Course Introduction and Book Checkout** **Topic 1 – Types of Navigation, Introduction Plotting and the Piloting Team** Read: Syllabus, Dutton's: Ch. 1, Hobbs: Ch. 1-3, NAVDORM Ch. 2	
2		**Topic 2 – Terrestrial Coordinate System / Chart Projections / Geodesy and Datums** Read: Dutton's: Ch. 2-3, Hobbs: Ch. 4 **Laboratory 1 – Chart Reading**	Hobbs WB: Ch. 1-3 Lab #1
3		**Topic 3 – Navigation Publications** Read: Dutton's: Ch. 5, Hobbs: Ch. 4-5	Hobbs WB: 8
4		**Topic 4 – Visual Navigation Aids** Read: Dutton's: Ch. 6, Hobbs: 6 **Laboratory 2 – Lights and Visual Navigation Aids**	Hobbs WB: 7, 9 (Sections 1 + 2) Lab #2
5		**QUIZ 1**	Hobbs WB: 4-5

		Topic 5 – Compasses Read: Dutton's: Ch. 7, Hobbs: Ch. 9 **Topic 6 – Navigation Equipment** Read: Dutton's: Ch. 8, Hobbs: 7	
6		**Topic 7 – Dead Reckoning** Read: Dutton's: Ch. 9, Hobbs: Ch. 8 **Topic 8 – Piloting** Read: Dutton's: Ch. 12, Hobbs: 8, 10 **Laboratory 3 – Plotting Exercise**	Hobbs WB: 6, 9 (Section 3) Lab #3
7		**QUIZ 2** **Topic 9 – Tides and Currents** Read: Bowditch: Ch. 9, Dutton's: Ch. 10-11, Hobbs: 11-12 **Topic 10 – Current Sailing** Read: Bowditch: Ch. 35-38, Dutton's: Ch. 13, Hobbs: Ch. 13	
8		**Topic 11 – Precise Piloting** Read: Dutton's: Ch. 14, Hobbs: Ch. 14 **Topic 12 – Voyage Planning and Time** Read: Dutton's: Ch. 23, Hobbs: Ch. 15	Hobbs WB: 11
9		**QUIZ 3** **Topic 13 / Laboratory 4 – Practical Plotting Exercise**	Lab #4
10		**EXAM 1 – Marine Navigation**	
Section II: Introduction to Electronic Navigation			
11		**Topic 14 – Global Positioning System (GPS)** Read: Bowditch: Ch. 2, 11, Dutton's; Ch. 17 **Topic 15 – Electronic Charts and ECDIS-N** Read: Dutton's: Ch. 4, NAVDORM: Ch. 5	Azimuth Handout
12		**Topic 16 – Radar Navigation** Read: Bowditch: Ch. 13, Dutton's: Ch. 12, Hobbs: Ch. 10 **Topic 17 – Weather** Read: WOG: Ch. 9	METOC Handout
13		**QUIZ 4** **Topic 18 – "The USS PORT ROYAL (CG 73) Grounding" Case Study** Read: "Case Study: Cruiser Grounding" Event summary by CAPT Neil Parrott, Commanding Officer, Surface Warfare Officers School Command (available on Blackboard), NAVDORM: Ch. 3-4	
Section III: Rules of the Road			
14		**Topic 19 – Purpose and Scope of International and Inland Rules** Read: COLREGS: Rules 1-10 **Topic 20a – Steering and Sailing Rules** Read: COLREGS: Rules 11-19	
15		**QUIZ 5** **Topic 20b – Steering and Sailing Rules** Read: COLREGS: Rules 20-36	

		Topic 21 – Lights, Dayshapes, and Sound Signals Read: COLREGS: Appendices	
16		**EXAM 2 – Electronic Navigation / Rules of the Road**	
Section IV: Introduction to Relative Motion			
17		**Topic 22 – Maneuvering Board Fundamentals** Read: MOBOARD: Ch. 1-4	
18		**Topic 23 – Basic Tracking and Stationing** Read: MOBARD: Ch. 5, 12 **Laboratory 5 – Maneuvering Board Fundamentals**	Lab #5
19		**QUIZ 6** **Final Review**	
20		**EXAM 3 - FINAL**	Final Chart Plot Due

IMPORTANT ACADEMIC POLICIES AND SERVICES

Disability Services: UMBC is committed to eliminating discriminatory obstacles that disadvantage students based on disability. Student Support Services (SSS) is designated to receive and maintain confidential files of disability-related documentation, certify eligibility for services, and determine reasonable accommodations. If you have a disability and want to request accommodations, contact SSS in the Math/Psych Bldg., room 213 or at 410-455-2459. If you require accommodations for this class, make an appointment to meet with me to discuss your SSS-approved accommodations, or any other concerns that you have.

Equity, Diversity, Equal Opportunity, and Affirmative Action: UMBC provides equal access to and opportunity in its programs and facilities, without regard to race, color, creed, religion, national origin, gender, age, marital status, disability, public assistance status, veteran status, sexual orientation, gender identity, or gender expression.

Mental Health and Stress Management: As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance and may reduce your ability to participate in daily activities. University services are available to assist you. You can learn more about the broad range of confidential mental health services available on campus via the Counseling Center at http://counseling.umbc.edu/services/.

Student Success Center: UMBC's comprehensive undergraduate academic support program designed to help students reach their academic goals and become independent, lifelong learners. The Learning Resource Center collaborates with students, faculty, staff, and the community to conduct programs that maximize learning success at an honors university.

Inclement Weather Policy: Students are strongly encouraged to consult the UMBC Student Handbook and Academic Catalog and the University website for detailed information regarding the above items.

VALUES STATEMENT

By enrolling in this course, each student assumes the responsibilities of an active participant in UMBC's scholarly community in which everyone's academic work and behavior are held to the highest standards of honesty. Cheating, fabrication, plagiarism, and helping other to commit these acts are all forms of academic dishonesty, and they are reprehensible. Academic misconduct could result in disciplinary action that may include, but not limited to, suspension or dismissal. To read the full Student Academic Conduct Policy, consult the UMBC Student Handbook, the Faculty Handbook, or the Policies section of the UMBC Director.