Smart Coasts: OCN 479
Fall 2022: Aug 24–Dec 7
CMS MarineQuest Lab

OCN 479: Smart Coasts
Fall 2022
Center for Marine Science (CMS)
MarineQuest Lab
2 credits: 1 hour lecture; 2 hours lab

Prof. Phil Bresnahan
bresnahanp@uncw.edu

Student hours: by appointment
(email me and/or ask during class)

This syllabus is a working draft and is subject to change. I will provide ample notice of changes in assignments/due dates so that you can plan accordingly.

Transportation to the Center for Marine Science:

CMS is located at 5600 Marvin K. Moss Ln. Transportation from campus is available via the CREST Shuttle. See the UNCW Transportation webpage and app for more information.
https://uncw.edu/transportation/shuttles.html

Student Office Hours:

Please email me to set up a time to meet (with your whole group if it pertains to group work).

Course Overview:

Advanced design and analysis of Smart Coastal monitoring systems and datasets. Study and application of the techniques used to observe coastal dynamics in near real time and provide not just data but also distilled information for research, operational, and educational uses.

The coastal ocean is incredibly dynamic; understanding changes in near real-time is critical for both research and operational needs (e.g., human safety). Moreover, the coast's proximity to/contact with land opens up a wide range of possibilities for sensor deployments (piers, docks, small boats, research vessels, bridges, etc.) and communications (both hard-wired and wireless). Smart devices—those which rely on cutting-edge (and frequently low-cost) sensors, programming, machine learning, and communications technologies—are increasingly being distributed for real-time monitoring, especially in more densely populated areas.

Smart Coasts will be an applied learning course, including a survey of the methods used to monitor physical, chemical, and geological changes in coastal and estuarine settings and an in-depth, hands-on development of and experimentation with a specific technique, to be determined by student

groups. We will cover technological advances that enable autonomous and/or high spatiotemporal coverage data collection in coastal ecosystems, including: moored *in situ* sensors, mobile aerial, surface, and underwater vehicles, and satellite remote sensing, as well as the communication technologies that enable rapid data collection and dissemination, including Iridium, cellular, Wi-Fi, Bluetooth, Ethernet, serial, and novel Internet of Things techniques. Finally, we will refine data analysis and communication with specific and varied audiences in mind.

Canvas Website:

A Canvas site has been created for this course. I will use Canvas to send messages and post announcements and you will use Canvas to submit your work. *You are expected to check this website regularly*. Failure to check the website will not be a valid excuse for missing class assignments or readings.

Grades:

The grade for this class will come from a combination of participation, several small group presentations, a final group presentation, and a final report. Graduate students (OCN 579) have additional requirements described below.

Undergraduate Grading (OCN 479)
Participation: 25%
Class presentations: 25%
Final presentation: 25%
Final report: 25%

Grade Policy: The grade system for this class is below. There is no rounding (e.g., an 89.9 is < 90 and greater than or equal to 87 and therefore a B+).

93 ≤ A	87 ≤ B+ < 90	77 ≤ C+ < 80	67 ≤ D+ < 70
90 ≤ A- < 93	83 ≤ B < 87	73 ≤ C < 77	60 ≤ D < 67
	80 ≤ B- < 83	70 ≤ B- < 73	F < 60

Attendance:

I prefer to treat you as adults and not take attendance every class. However, it's a hands-on, lab-based class and much of our work will take place during class hours. Multiple absences, absences on presentation days, and/or not fully engaging in class-time activities will result in deductions to your participation grade.

Final Project Presentation and Report:

Throughout the semester, you will work toward developing a new technology (which will take the form of hardware, firmware, and/or data visualization software) for a fictitious science museum/aquarium/nature center and their guests. Choosing this audience allows us to work toward novel Smart Coasts technologies that could be used for research, operational, and/or

educational purposes (to be determined through class discussions). Additionally, it encourages refinement of the critical skill of science communication to lay audiences. We will solicit feedback on project ideas from local stakeholder groups, such as the Fort Fisher Aquarium, UNCW's MarineQuest, NC Sea Grant, National Estuarine Research Reserve, and others.

The final report will be written in the form of a "continuity document." That is, rather than thinking of it as a final report that no one will ever read after this semester, you are to think of it as a manual for a future team to use as their starting guide. How does the technology work? What are its intended uses? What works well and what milestones did you reach? What needs to be improved? What hurdles did you run into that other groups should try to avoid?

Your work will be graded on perceived effort, attention to detail, and novelty. Perceived effort will be based on your active participation in classes. Attention to detail will be based on how well you describe your work in both written and oral presentation formats as well as your ability to maintain an organized file system to hand off to future classes. Finally, the novelty can be in a number of different categories: e.g., it can be a less expensive or more accurate technology, it can use novel communication technologies, it can rely on different platforms, and/or it can help teach oceanographic principles to new audiences in novel ways.

Student Learning Outcomes:

- **SLO 1:** Evaluate and synthesize information from various sources to develop testable hypotheses as part of a planned research project
- **SLO 2:** Use appropriate technologies and methodologies to collect data required to test hypotheses generated as part of a planned research project
- **SLO 3:** Use appropriate mathematical, statistical, or time series techniques to interpret oceanographic data as part of a planned research project
- **SLO 4:** Synthesize and communicate the way(s) that fundamental oceanographic processes, technology, and observations can impact society through writing and oral presentations

COVID-19:

Students who experience COVID-19 symptoms should immediately contact the Abrons Student Health Center at (910) 962-3280 and not attend class. After appropriately dealing with your health, please contact me to discuss any make-up work.

Email Policy:

If you have a question about something or need to email me for any reason, please make sure you do it as follows.
Subject: OCN 479 question/comment
Body: Make sure your question is something that is not addressed on the syllabus or on Canvas. Make sure to include your name and student ID number. And please be polite!
CC your teammates if it pertains to a group project.

Disclaimer:

I reserve the right to change parts of this syllabus throughout the semester. I will notify the class during lecture and on Canvas of any updates.

Honor Code:

All members of UNCW's community are expected to follow the academic Honor Code. Please read the UNCW Honor Code carefully (as covered in the UNCW Student Handbook and available here: http://www.uncw.edu/odos/honorcode/). Academic dishonesty in any form will not be tolerated in this class. Please be especially familiar with UNCW's position on plagiarism as outlined in the UNCW Student Handbook. Plagiarism is a form of academic dishonesty in which you take someone else's ideas and represent them as your own. Here are some examples of plagiarism:

1. You write about someone else's work in your paper and do not give them credit for it by referencing them.
2. You give a presentation and use someone else's ideas and do not state that the ideas are the other person's.
3. You get facts from your textbook or some other reference material and do not reference that material.

Additional Information:

Technical support for Canvas: Information about Canvas can be found at: https://uncw.edu/canvas/. From the Help button within Canvas, you'll have access to:

- 24/7 Canvas Support via phone or chat
- Student support number1-833-395-9053
- The ability to submit a Canvas support ticket
- Access to the Canvas Guides
- Access to the Canvas community site
- Submitting a feature idea

Canvas System Status: https://status.instructure.com/

The University Learning Center (DePaolo Hall 1056, www.uncw.edu/ulc) is available to help students become successful, independent learners. ULC services are free to all UNCW students and include the following: Academic Achievement Services, Math Services, Study Sessions, Supplemental Instruction, Tutoring Services, and Writing Services.

Disability Services: Students with diagnosed disabilities should contact the Office of Disability Services (962-7555). Please give me a copy of the letter you receive from Office of Disability Services detailing class accommodations you may need. If you require accommodation for test-taking, please make sure I have the referral letter no fewer than three days before the test. Students with Disabilities information and resources available at http://www.uncw.edu/stuaff/disability/.

The UNCW Statement on Diversity in the University Community: As an institution of higher learning, the University of North Carolina Wilmington represents a rich diversity of human beings among its faculty, staff, and students and is committed to maintaining a campus environment that values that diversity. Accordingly, the university supports policies, curricula, and co-curricular activities that encourage understanding of and appreciation for all members of its community and will not tolerate any harassment or disrespect for persons because of race, gender, age, color, national origin, ethnicity, creed, religion, disability, sexual orientation, political affiliation, marital status, or relationship to other university constituents.

Zero Tolerance Policy: UNCW practices a zero-tolerance policy for violence and harassment of any kind. For emergencies contact UNCW CARE at 962-2273; Campus Police at 962-3184; or

Wilmington Police at 911. For University or community resources visit: http://www.uncw.edu/safe-relate/campusResources.htm. Violence prevention information and resources are available at http://www.uncw.edu/safe%2Drelate/.

Non-Discrimination Statement: Individuals who wish to report any form of gender-based discrimination or sexual misconduct/harassment—and those requesting related accommodations—should contact UNCW's Title IX Office (www.uncw.edu/titleix). Students may also report incidents of misconduct to their faculty; however, be aware that faculty are required by law to notify the Title IX office. If students wish to seek confidential resources without reporting an incident, three departments at UNCW are exempt from mandatory reporting requirements: CARE: Interpersonal Violence Prevention & Response, University Counseling Center, and Abrons Student Health Center. Office of Title IX & Clery Compliance: DePaolo Hall, Suite 1033A; 910.962.3557; titleix@uncw.edu.

Course Material Copyright: Any dissemination of class notes, lecture slides, recordings, handouts, copies of exams, or any other course materials without permission of the instructor is prohibited by UNCW policy. UNCW Copyright Use and Ownership Policy (http://www.uncw.edu/policies/documents/01210.copyrightpolicy.pdf) specifies that class notes and related materials are considered derivative of original intellectual property of the course instructor. Therefore, the instructor (not the student) owns the copyright and must provide specific permission to distribute and/or reuse those materials for anything other than personal use and scholarship by the student. Commercial use, display, or dissemination of such notes, copies, or recordings—as well as posting to websites—will generally constitute an infringement of copyright and the Honor Code. Materials that qualify as student-owned are listed in the policy.

Smart Coasts: OCN 479
Fall 2022: Aug 24–Dec 7
CMS MarineQuest Lab

Calendar

REFER TO CANVAS FOR THE MOST UP-TO-DATE CALENDAR! This document is a general sketch, not a final plan.			
Week #	**Date**	**Theme**	**Assignment**
1	8/25	Syllabus, meet your professor, semester overview, GitHub overview	
2	9/1	CMS Pier tour, description of scientific assets (*Dave Wells*)	Groups select and begin research on parameter of interest from current suite of CMS measurements
3	9/8	Deployment regimes (e.g., moored, profiling, surface vehicle, drone, etc.)	Short group presentation 1: coastal technologies
4	9/15	Communications, part I: wired	
5	9/22	Communications, part II: wireless	Short group presentation 2: communications
6	9/29	Parameters of interest	
7	10/6	Applications of interest (e.g., research, operational)	Short group presentation 3: parameters
8	10/13	**FALL BREAK**	
9	10/20	All Blue, Blue Economy, Customer Discovery (*Heather McWhorter, Justin Streuli, Troy Alphin*)	
10	10/27	Sensor and platform maintenance	Individual: draft continuity document submission
11	11/3	Data management	
12	11/10	Data analysis, part I: time-series	Short group presentation 4: field plan
13	11/17	Data analysis, part II: mapping	
14	11/24	**THANKSGIVING**	
15	12/1	Data visualization and storytelling: who is your intended audience?	Deploy sensors
16	12/8	READING DAY	
Finals week			Final presentations