FLORIDA ATLANTIC UNIVERSITY

NEW COURSE PROPOSAL
Undergraduate Programs

Department Ocean & Mechanical Engineering

College Engineering & Computer Science

*(To obtain a course number, contact **erudolph@fau.edu**)*

UUPC Approval 4-26-21
UFS Approval _____
SCNS Submittal _____
Confirmed _____
Banner Posted _____
Catalog _____

Prefix EOC **Number** 4600	*(L = Lab Course; C = Combined Lecture/Lab; add if appropriate)* **Lab Code**	**Type of Course** Lecture	**Course Title** Introduction to Ocean Instrumentation

Credits *(Review Provost Memorandum)*: 3

Effective Date *(TERM & YEAR)*: Fall 2021

Grading *(Select One Option)*: **Regular** (●) **Pass/Fail** ( ) **Sat/UnSat** ( )

Course Description *(Syllabus must be attached; Syllabus Checklist recommended; see Guidelines)*
This course provides an overview of instrumentations and data analysis that are required for design, fabrication and calibration of ocean systems such as: offshore structures, underwater vehicles, surface vessels, underwater acoustic imagery, underwater optical imagery and pressure vessels.

Prerequisites, with minimum grade*
EOC3130L (Ocean Engineering Laboratory) or permission from instructor with a grade of C or above

Corequisites
None

Registration Controls *(Major, College, Level)*

***Default minimum passing grade is D-.** **Prereqs., Coreqs. & Reg. Controls are enforced for all sections of course**

WAC/Gordon Rule Course
( ) Yes (●) No

WAC/Gordon Rule criteria must be indicated in syllabus and approval attached to proposal. See WAC Guidelines.

Intellectual Foundations Program (General Education) Requirement *(Select One Option)*
None

General Education criteria must be indicated in the syllabus and approval attached to the proposal. See GE Guidelines.

Minimum qualifications to teach course
PhD

Faculty Contact/Email/Phone
Dr Beaujean
pbeaujea@fau.edu/954-924-7051

List/Attach comments from departments affected by new course

Approved by	***Date***
Department Chair: Digitally signed by Manhar Dhanak DN: cn=Manhar Dhanak, o=Florida Atlantic University, ou=Ocean and Mechnical Engineering, email=dhanak@fau.edu, c=US Date: 2021.04.12 13:15:20 -05'00'	4-12-21
College Curriculum Chair: Daniel M	4/12/2021
College Dean: Fred Bloetscher	4-15-21
UUPC Chair: Jerry Haky	4-26-21
Undergraduate Studies Dean: Edward Pratt	4-26-21
UFS President	
Provost	

Email this form and syllabus to mjenning@fau.edu seven business days before the UUPC meeting.

Department of Ocean and Mechanical Engineering
Florida Atlantic University
Course Syllabus

1. Course title/number, number of credit hours	
Introduction to Ocean Instrumentation - EOC 4600	3 credit hours

2. Instructional Method

Due to the COVID-19 situation, this course will exceptionally be taught as a hybrid course this semester:

1) Every class material will be posted on CANVAS approximately one week before the lecture, in the form of Powerpoint/Word/PDF/scanned document.
2) The lectures will be offered via ZOOM during scheduled class time. During these lectures, class material, examples and discussions will be offered. ZOOM lectures will be accessed in CANVAS: login CANVAS, select this course, select ZOOM in the left column (it will probably be at the bottom) and click on the upcoming meeting for the appropriate date.
3) Every week, students can sign up to seat in the physical class room (ST209 at the Dania Beach SeaTech campus). To do so, you must use the sign-up tool on CANVAS. Instructions on how to use the tools are provided in the FILE folder "Seat reservation instructions".
4) Quizzes, midterms and finals will also take place online using CANVAS testing features. The procedure will be explained in class.
5) This course includes 4 short projects which can be completed remotely.

Additional instructions for this Hybrid Course:

6) *Canvas* registration is required.
7) The instructor will regularly post materials/announcements on *Canvas*. It is the student's responsibility to regularly check *Canvas* and FAU email for the most recent information.
8) No hard-copy handouts will be provided. Copies will be posted in files on *Canvas*.
9) If you wish to discuss material with the instructor, you will first need a reliable internet condition capable of streaming ZOOM and WEBEX. Recommended: Broadband Internet connection with a speed of 4 Mbps or higher. To function properly, Canvas requires a high-speed Internet connection (cable modem, DSL, satellite broadband, T1, etc.). The minimum Internet connection speed to access Canvas is a consistent 1.5 Mbps (megabits per second) or higher. Check your Internet speed here.
10) Students should have an operational computer system equipped with Windows 10 or macOS Sierra (or higher), Microsoft Office, web browser, a webcam, speakers, and microphone, which should be compatible with the most recent version of ZOOM and Cisco WEBEX.
11) These are the links where you can find the steps to use your cell phone as a webcam.
    For Android:
    https://helpdesk.fau.edu/TDClient/2061/Portal/KB/ArticleDet?ID=104057
    For iPhone or iPad
    https://helpdesk.fau.edu/TDClient/2061/Portal/KB/ArticleDet?ID=104056

In the event you might not have a computer, there is a Laptop Loaner Program at FAU for first-generation, low-income students.
https://www.fau.edu/newsdesk/articles/fau-announces-laptop-loaner-program.php

3. COVID 19 Statement

All students in face-to-face classes are required to wear masks during class, and students must sanitize their own workstations upon entering the classroom. Taking these measures supports the safety and protection of the FAU community. Students who do not adhere to these rules will be asked to leave the classroom and/or be removed from the course. Students experiencing flu-like symptoms (fever, cough, shortness of breath), or students who have come in contact with an infected person should immediately contact FAU Student Health Services (561-297-3512).

4. Course prerequisites, corequisites, and where the course fits in the program of study

Prerequisites: EOC3130L (Ocean Engineering Laboratory) or permission from instructor with a grade of C or above

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Course Syllabus

5. Course logistics

Term: Summer 2021
This is a classroom lecture course with 5 projects
Class location and time: TBD, 80 min lectures
The course has no design content

6. Instructor contact information

Instructor's name	Dr. Pierre-Philippe Beaujean
Office address	Seatech: 101 North Beach Road
Office Hours	Room 225A
Contact telephone number	Dania Beach, FL 33004
Email address	pbeaujea@fau.edu

7. TA contact information

TA's name	None
Office address	
Office Hours	
Contact telephone number	
Email address	

8. Course description

This course provides an overview of instrumentations and data analysis that are required for design, fabrication and calibration of ocean systems such as: offshore structures, underwater vehicles, surface vessels, underwater acoustic imagery, underwater optical imagery and pressure vessels.

9. Course objectives/student learning outcomes/program outcomes

Course objectives	The objective of the course is to provide the students with basic and applied knowledge of ocean instrumentation, with a focus on ship instrumentation, motion sensors, positioning, underwater imagery, measurement of strain, and analysis of strain gage data.
Student learning outcomes & relationship to ABET 1-7 objectives	1. An ability to analyze measurement uncertainties. (1) 2. An ability to present the results of an experiment in a professional manner. (3) 3. An ability to conduct engineering experiments with proper consideration of the type and amount of data to be acquired, the accuracy of the measurements to be made, a plan to reduce and analyze the data, and the quantification of the uncertainty of the outcome. (6)

10. Course evaluation method

Homework	20%	Homework problems will be assigned on a regular basis.
Projects	30%	
Mid-Term Exam	20%	
Final Exam	30%	

11. Course grading scale

A (95%-100%), A- (90%-94%), B+ (85%-89%), B (81%-84%), B- (76%-80%), C+ (71%-75%), C (67%-71%), C- (62%-66%), D+ (57%-61%), D (52%-56%), D- (45%-51%), F (below 45%)

The final grade for the course will be the numerical average of grades assigned for all work specified above weighted according to the percentages shown. The instructor reserves the right, in exceptional cases, to raise or lower the final numerically averaged course grade by 2.5% in cases where the instructor does not believe that the average is representative of the student's performance in the class (for example if the grade in the final exam is much better than in the rest of the course). Normally, the student will receive the numerically averaged letter grade for the course.

12. Policy on makeup tests, late work, and incompletes

Makeup tests are given only if there is solid evidence of a medical or otherwise serious emergency that prevented the student of participating in the exam. Makeup exam should be administered and proctored by department personnel unless there are other pre-approved arrangements.

Late work is not acceptable.

Incomplete grades are against the policy of the department. Unless there is solid evidence of medical or otherwise serious emergency situation incomplete grades will not be given.

13. Special course requirements

None.

14. Classroom etiquette policy

University policy requires that in order to enhance and maintain a productive atmosphere for education, personal communication devices, such as cellular phones and laptops, are to be disabled in class sessions.

15. Attendance Policy Statement

Students are expected to attend all of their scheduled University classes and to satisfy all academic objectives as outlined by the instructor. The effect of absences upon grades is determined by the instructor, and the University reserves the right to deal at any time with individual cases of non-attendance.

Students are responsible for arranging to make up work missed because of legitimate class absence, such as illness, family emergencies, military obligation, court-imposed legal obligations or participation in University approved activities. Examples of University-approved reasons for absences include participating on an athletic or scholastic team, musical and theatrical performances and debate activities. It is the student's responsibility to give the instructor notice prior to any anticipated absences and within a reasonable amount of time after an unanticipated absence, ordinarily by the next scheduled class meeting. Instructors must allow each student who is absent for a University-approved reason the opportunity to make up work missed without any reduction in the student's final course grade as a direct result of such absence.

16. Disability policy statement

In compliance with the Americans with Disabilities Act Amendments Act (ADAAA), students who require reasonable accommodations due to a disability to properly execute coursework must register with Student Accessibility Services (SAS)—in Boca Raton, SU 133 (561-297-3880); in Davie, LA 203 (954-236-1222); or in Jupiter, SR 110 (561-799-8585) —and follow all SAS procedures.

17. Counseling and Psychological Services Center

Life as a university student can be challenging physically, mentally and emotionally. Students who find stress negatively affecting their ability to achieve academic or personal goals may wish to consider utilizing FAU's Counseling and Psychological Services (CAPS) Center. CAPS provides FAU students a range of services – individual counseling, support meetings, and psychiatric services, to name a few – offered to help improve and maintain emotional well-being. For more information, go to http://www.fau,edu/counseling/

18. Code of Academic Integrity Policy Statement

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high quality education in which no student enjoys unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and place high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. See University Regulation 4.001 at
www.fau.edu/regulations/chapter4/4.001_Code_of_Academic_Integrity.pdf

Cell phones are not allowed during exams. If cell phones are detected during any exam periods, this will result in a **grade of "zero" on that exam and a note in the student's academic file.**

19. Required texts/reading

Marc Le Menn, "Instrumentation and metrology in oceanography", ISBN: 978-1-84821-379-1, Wiley

20. Supplementary/recommended readings

M.S. Grewal, L.R. Weill, A.P. Andrews, Global Positioning Systems, Inertial Navigation and Integration Wiley-Interscience

21. Course topical outline, including dates for exams/quizzes, papers, completion of reading

Course Topics:

1) Ocean instrumentation platforms and sensors
   a) Ships and ship-mounted instruments
   b) Autonomous vehicles (surface, underwater, gliders) and associated sensors
   c) Buoys and buoy-mounted instruments
   d) Towed bodies
   e) Offshore structures
   f) Lab 1: ship instrumentation
2) Position and motion sensing
   a) Scientific background
   b) Technology
   c) Lab 2: shipboard motion sensing
3) Underwater imagery
   a) Scientific background
   b) Technology
   c) Labs 3 and 4: underwater acoustic and video imagery
4) Environmental data collection
   a) Scientific background
   b) Technology
   c) Mapping
5) Strain Measurement in Ocean Platforms and Structures
   a) Types
   b) Strain and the stress-strain relations
   c) Strain measurement methods and related instrumentations
   d) Analysis of strain gage data
   e) Underwater pressure vessels and pipelines
   f) Lab 5: stress analysis in a pressure vessel under hydrostatic pressure

No Class: May 27th (Memorial Day); July 4th (Independence Day)

Canvas: Class notes, practice exercises and problems, laboratory assignments and other administrative information will be posted on *Canvas*. Make sure you can access the information related to this class as early as possible.

Homework: Weekly homework will be assigned. The instructor will post the solutions on *canvas*. Homework posting and due dates are given in the course schedule at the end of the syllabus.

Computer and Laboratory Projects: Complete 5 computer and/or laboratory projects which are focused on ship instrumentation, motion sensors, positioning, underwater imagery, measurement of strain, and analysis of strain gage data. Every assignment is considered as an individual work. Do not submit any work that is not yours. It is encouraged to exchange ideas between students, but do not copy any portions of another student's work. The programs written must be included in the report. Project posting and due dates are given in the course schedule at the end of the syllabus.

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Course Syllabus

Class	Material Covered	Assignment
1	Ocean instrumentation and platforms	
2	Ocean instrumentation and platforms	
3	Ocean instrumentation and platforms	HW#1
4	Lab 1 - ship instrumentation (replaces class)	Lab 1
5	Position and motion sensing	
6	Position and motion sensing	
7	Position and motion sensing	
8	Position and motion sensing	HW#2
9	Lab 2 - shipboard motion sensing (replaces class)	Lab 2
10	Midterm	
11	Underwater acoustic transduction	
12	Underwater acoustic transduction	
13	Underwater acoustic transduction	HW#3
14	Lab 3 - acoustic transduction	Lab 3
15	Underwater acoustic and optical imagery	
16	Underwater acoustic and optical imagery	
17	Underwater acoustic and optical imagery	
18	Underwater acoustic and optical imagery	HW#4
19	Environmental data collection	
20	Environmental data collection	Lab 4
21	Lab 4 - acoustic imagery (replaces class)	
22	Materials	
23	Materials	HW#5
24	Lab 5 - pressure vessel strain (replaces class)	Lab 5
	Final Examination - TBD	