UNIVERSIDAD DE PUERTO RICO RECINTO
UNIVERSITARIO DE MAYAGUEZ
DECANATO DE ASUNTOS ACADÉMICOS

SOLICITUD PARA MODIFICACIONES A CURSOS REGISTRADOS

Unidad: Universidad de Puerto Rico Mayagüez **Colegio:** Artes y Ciencias

Departamento/Programa: Programa de Maestría en Ciencias Marinas y Doctorado en Filosofía

Título del Curso: Ciencia de datos públicos en oceanografía química **Codificación Alfanumérica:** CMOQ 6008

INFORMACIÓN SOBRE CAMBIOS SOLICITADOS		
TIPO DE CAMBIO	**INFORMACIÓN VIGENTE**	**CAMBIO SOLICITADO**
[ ] Código alfabético	CMOQ	
[ ] Código numérico	6008	
[ ] Título en español	Ciencia de datos públicos en oceanografía química	
[ ] Título en inglés	Open data science in chemical oceanography	
[ ] Tipo de curso	Graduado	
[ ] Modalidad en que se ofrece		
[ ] Ubicación de curso		
[ ] Prerrequisitos		
[ ] Correquisitos		
[ ] Sistema de calificación		
[X] Horas de contacto	1 Crédito = 3 horas Laboratorio Semanales	3 Créditos = 3 horas Laboratorio y 2 horas Conferencia Semanales
[X] Descripción		

DESCRIPCIÓN EN ESPAÑOL ANTERIOR	NUEVA DESCRIPCIÓN EN ESPAÑOL
Este curso explora los principios de la oceanografía química a través de la descripción de patrones de datos de oceanografía química de acceso público a partir de series temporales oceánicas, sensores remotos satelitales y resultados de modelos climáticos del sistema terrestre. Los estudiantes recibirán instrucciones sobre cómo descargar y gestionar datos públicos, usar cajas de herramientas de oceanografía química, desarrollar visualizaciones científicas con calidad de publicación y describir los procesos oceanográficos en un flujo de trabajo reproducible.	Exploración de los principios de la oceanografía química a través de la descripción de patrones de datos de oceanografía química de acceso público a partir de series temporales oceánicas, sensores remotos satelitales y resultados de modelos climáticos del sistema terrestre. Acceso y depuración de datos públicos, uso de cajas de herramientas de oceanografía química, desarrollo de visualizaciones científicas con calidad de publicación y descripción de los procesos oceanográficos en un flujo de trabajo reproducible. Se incluye un laboratorio para practicar código con supervi

Este curso se podrá ofrecer en alguna de las siguientes modalidades: presencial, híbrido o en línea.	
DESCRIPCIÓN EN INGLÉS ANTERIOR This course explores the principles of chemical oceanography through the description of publicly available chemical oceanography data patterns from ocean time series, satellite remote sensing, and Earth system climate model output. Students will be instructed on how to download and wrangle publicly available data, use chemical oceanography toolboxes, develop publication-quality scientific visualizations, and describe oceanographic processes in a reproducible workflow. This course may be offered in any of the following modalities: face-to-face, hybrid or online.	NUEVA DESCRIPCIÓN EN INGLÉS Exploration the principles of chemical oceanography through the description of publicly available chemical oceanography data patterns from ocean time series, satellite remote sensing, and Earth system climate model output. Retrieval and wrangling of publicly available data, use chemical oceanography toolboxes, develop publication-quality scientific visualizations, and describe oceanographic processes in a reproducible workflow. A lab to practice coding with supervision is included.

Justificación de los cambios:

La mayoría de los estudiantes que ha tomado este curso quiere más horas semanales para aprender y practicar el código entonces me gustaría modificar el curso para añadir tiempo dedicado por instrucciones de modo de conferencia y mantener el tiempo del laboratorio para hacer el practico de código.

Fecha de efectividad de los cambios: _____

APROBACIÓN Y CERTIFICACIÓN A NIVEL DEL DEPARTAMENTO	**NOMBRE Y FIRMA**	**FECHA**
Director de Departamento		
APROBACIÓN Y CERTIFICACIÓN A NIVEL DE LA FACULTAD	**NOMBRE Y FIRMA**	**FECHA**
Decano de la Facultad		
APROBACIÓN Y CERTIFICACIÓN A NIVEL DEL DECANATO DE ASUNTOS ACADÉMICOS	**NOMBRE Y FIRMA**	**FECHA**
Decano de Asuntos Académicos		

University of Puerto Rico
Mayagüez Campus
College of Arts and Sciences
Department of Marine Sciences

COURSE SYLLABUS

GENERAL INFORMATION:

COURSE TITLE:	**Ciencia de datos abiertos en oceanografía química**
ALPHANUMERIC CODIFICATION:	CMOQ 6008
CONTACT HOURS / CREDITS	30 hours lecture + 45 hours lab / Three credits
PREREQUISITES, COREQUISITES AND OTHER REQUIREMENTS:	N/A

COURSE DESCRIPTION:

ENGLISH: This course explores the principles of chemical oceanography through the description of publicly available chemical oceanography data patterns from ocean time series, satellite remote sensing, and Earth system climate model output. Students will have lectures to learn how to download and wrangle publicly available data, use chemical oceanography toolboxes, develop publication-quality scientific visualizations, and describe oceanographic processes in a reproducible workflow with a lab to practice coding with supervision. **«In-Person course»**

SPANISH: Este curso explora los principios de la oceanografía química a través de la descripción de patrones de datos de oceanografía química de acceso público a partir de series temporales oceánicas, sensores remotos satelitales y resultados de modelos climáticos del sistema terrestre. Los estudiantes tendrán una conferencia para aprender sobre cómo descargar y gestionar datos públicos, usar cajas de herramientas de oceanografía química, desarrollar visualizaciones científicas con calidad de publicación y describir los procesos oceanográficos en un flujo de trabajo reproducible con un laboratorio para practicar código con supervisión. **«Curso Presencial».**

LEARNING OBJECTIVES:

At the end of the course students will be able to:

1. Download and analyze data from publicly available oceanography data repositories following open data science best practices.
2. Use chemical oceanography toolboxes to quantify changes in seawater physicochemical parameters.
3. Generate publication quality data visualizations and reproducible reports to describe principles of chemical oceanography from raw data.

SUGGESTED TEXTBOOK: The Ocean Health Index Team (2019) *Introduction to Open Data Science* https://ohi-science.org/data-science-training/

COURSE OUTLINE AND TIME DISTRIBUTION:

CONFERENCE TOPIC	TIME DISTRIBUTION (HOURS)
Lecture: Introduction to coding and reproducible workflows	6 hours
Lab: Coding Practice and Reproducible Workflows	9 hours
Lecture: Introduction to data visualization of chemical oceanography data	2 hours
Lab: Data Visualization of chemical oceanography data	3 hours
Lecture: Introduction to the deployment and retrieval of oceanographic sensors	2 hours
Lab: Deploying, retrieving, and analyzing data from oceanographic sensors	3 hours
Lecture: Introduction to coding with the Gibbs Seawater of State Toolbox	4 hours
Lab: Data analysis with the Gibbs Seawater of State Toolbox	6 hours
Lecture: Introduction to CO2 chemistry and coding with the CO2SYS toolbox	4 hours
Lab: Using the CO2SYS Toolbox	6 hours
Lecture: Introduction to climate models and extracting netCDF files	4 hours
Lab: Using oceanographic data from climate model outputs (CMIP6)	6 hours
Lecture: Introduction to publicly available oceanographic time series data	2 hours
Lab: Using oceanographic time series data (BATS, NOAA MAPCO2)	3 hours
Lecture: Introduction to remotely sensed data products and how to extract them using code	2 hours
Lab: Using data from remotely sensed sea surface temperatures (NOAA CoralTemp)	3 hours
Lab: Independent open data projects	6 hours
Assessments and presentations	4 hours
Total Contact Hours	**Lecture: 30 Hours** **Lab: 45 Hours**

INSTRUCTIONAL STRATEGIES:

Some of the following may be used:

☒ Lectures	☒ Project Based Learning
☐ Discussion	☐ Seminars or Workshops
☐ Cooperative Learning	☐ Problem Based Learning (PBL)
☐ Case Studies	☐ Flipped Classroom
☐ Lectures with Guest Speakers	

MINIMUM OR REQUIRED RESOURCES AVAILABLE:

RESOURCE	IN-PERSON
Classroom or laboratory	Institution
Account in the institutional learning management platform (e.g. Moodle or Blackboard)	Institution
Institutional email account	Institution
Computer with high-speed internet access or mobile device with data service	Student
Programs or applications: word processor, spreadsheets, presentation editor	Student
Webcam or mobile with camera and microphone	Student
Integrated or external speakers	Student
Whiteboard	Institution
Digital projector	Institution

ASSESSMENT TECHNIQUES:

Suggested Assessment Technique	Relative Weight
☒ Final Data Project	20%
☒ Assignments	70%
☒ Presentations	10%
Total:	**100%**

Standard scale: 90 to 100 A; 80 < 90 B; 70 < 80 C; 60 < 70 D; < 60 F

REASONABLE MODIFICATION (REASONABLE ACCOMMODATION):

The University of Puerto Rico (UPR) acknowledges the right of students with disabilities to an inclusive, equitable, and comparable post-secondary education. In accordance with its policy toward students with disabilities, based on federal and state legislation, every qualified student with disabilities is entitled to equal participation in those services, programs, and activities that are physically, mentally or sensorially natured and have thus substantially affected one or more major life activities, such as their area of post-secondary studies. They have the right to receive reasonable accommodation or modifications. If you require accommodation or reasonable modification in the course, you must inform the professor without the need to disclose your condition or diagnosis. Simultaneously, you should promptly request the Office of Services for Students with Disabilities (OSEI) of the unit or campus for your need for modification or reasonable accommodation.

The University of Puerto Rico at Mayagüez (RUM) recognizes that each student has an inherited right to request reasonable accommodation according to Law 51: Law for Integral Educational Services for People with Disabilities. Every student has the right to receive reasonable accommodation if he/she presents the necessary evidence to be evaluated by the Office of Services to Students with Disabilities (OSEI-RUM), and the related information can be found at the following link: https://www.uprm.edu/cms/index.php/page/85. If your case is approved by OSEI-RUM, you will receive reasonable accommodation in your courses and evaluation, and you must contact each professor for course registered. For additional information contact OSEI-RUM at the Office of the Dean of Students, DE 12, via telephone 787-832-4040 extensions 6734 or 6735, email: oseirum@uprm.edu, at the virtual office: https://meet.google.com/yvd-nrqo-mor, or join by telephone: (US)+1 475-558-0169 PIN: 814 895 818#.

ACADEMIC INTEGRITY:

The University of Puerto Rico promotes the highest standards of academic and scientific integrity. Section 6.2 of the UPR General Student Regulations (Certification No.13, 2009-2010, Board of Trustees) provides that academic dishonesty includes, but is not limited to: "fraudulent actions, obtaining grades or academic degrees by false or fraudulent simulations, copying all or part of another's academic work, copying all or part of another's answer to questions on an examination, taking or having another take any oral or written test or examination on behalf of another, and aiding or facilitating another person to engaging such conduct." Any of these actions will be subject to disciplinary sanctions in accordance with the disciplinary procedure provided in the UPR General Student Regulations in force. To ensure the integrity and security of user data, all hybrid, distance-learning and online courses shall be offered through the institutional learning management platform or through tools required by the course, which uses secure connection and authentication protocols. The system authenticates the user identity using the username and password assigned through the student institutional account. The user is responsible for keeping secure, protecting, and not sharing their password with others.

POLICY AND PROCEDURES FOR MANAGING SEX AND GENDER-BASED DISCRIMINATION AT THE UNIVERSITY OF PUERTO RICO:

The Policy and procedures for managing Sex and Gender-Based Discrimination at the University of Puerto Rico, Certification No. 107 (2021-2022) of the Governing Board, certifies that the University of Puerto Rico, as an institution of higher learning and a workplace, safeguards the rights and offers a safe space for those who interact therein, whether they be students, employees, contractors, or visitors. It seeks to promote an environment that respects diversity and the rights of the university community. This policy provides a protocol for handling situations related to the following prohibited conduct in the workplace or in the academic setting: discrimination based on sex, gender, pregnancy, sexual harassment, sexual violence, domestic violence, dating, violence, and stalking.

CONTINGENCY PLAN IN CASE OF AN EMERGENCY OR INTERRUPTION OF CLASSES

In the event of an emergency or interruption of classes, the professor will contact the students through the institutional email or other available means to coordinate the continuity of the course.

The contingency plan must preserve the modality in which the course was created and programmed in the course offering.

Certification 23-29 of the Academic Senate establishes that an In-Person course may have up to 25% of the hours at a distance and if necessary, this option may be used.

GRADING SYSTEM

☒ Quantifiable (letters, A, B, C, D, F) ☐ Not Quantifiable (Pass, Fail)

BIBLIOGRAPHY:

The Ocean Health Index Team (2019) *Introduction to Open Data Science* https://ohi-science.org/data-science-training/

Wilke CO (2019) Fundamentals of Data Visualization. O'Reilly Media: 1st edition. 390 p. https://clauswilke.com/dataviz/

Lowndes JS, Best BD, Scarborough C, Afflerbach JC, Frazier MR, O'Hara CC, Jiang N, Halpern BS. Our path to better science in less time using open data science tools. Nature ecology & evolution. 2017 May 23;1(6):1-7. https://www.nature.com/articles/s41559-017-0160

Bryan J, STAT 545 Tas, Hester J (2021) Happy Git and GitHub for the useR. https://happygitwithr.com/

McDougall, T.J. and Barker, P.M., 2011. Getting started with TEOS-10 and the Gibbs Seawater (GSW) oceanographic toolbox. *SCOR/IAPSO WG*, *127*, pp.1-28. http://www.teos-10.org/pubs/gsw/v3_04/pdf/Getting_Started.pdf

Gattuso, J.P., Epitalon, J.M., Lavigne, H., Orr, J., Gentili, B., Hagens, M., Hofmann, A., Mueller, J.D., Proye, A., Rae, J. and Soetaert, K., 2021. Package 'seacarb'. http://vps.fmvz.usp.br/CRAN/web/packages/seacarb/seacarb.pdf

Ejemplos de Datos Abiertos:
Bermuda Atlantic Time-Series: http://bats.bios.edu/
PMEL Carbon Program:
https://www.pmel.noaa.gov/co2/story/Buoys+and+Autonomous+Systems
Climate Model Intercomparison Project 6: https://esgf-node.llnl.gov/projects/cmip6/
NOAA CoralTemp: https://coralreefwatch.noaa.gov/satellite/coraltemp.php