



UNIVERSIDAD SAN FRANCISCO DE QUITO
SCHOOL: CIENCIAS BIOLÓGICAS Y AMBIENTALES
COURSE: ECL 0335 –TECHNICHES OF MARINE RESEARCH I
Semester: 201820 – First Semester 2019/2020 - NRC: 4781
Schedule: LMIJV 09:00 – 11:50

PROFESSOR INFORMATION:**Names:** Juan Manuel Alava**E-mail:** elasmojuanma@gmail.com**Office:** DW-102 (Margarita Brandt's office)**Office hours:** please send me an email to set up an appointment**COURSE INFORMATION:****Credits:** 4**Pre-requisites:** None**Co-requisites:** None**COURSE DESCRIPTION:**

Students will immerse in the process of scientific research, from the basics, including the scientific method, to the production of a scientific paper. Students will learn how to collect and handle observations and data, formulate hypothesis and develop methods and techniques to test those hypotheses. Students will learn how to use statistical programs and other routines to explore, analyze and interpret the data.

This course includes a strong component in the field. After the first week, we will head to the coast, where we will visit one subtidal community and several rocky shores. There, students will learn the methods and techniques to monitor the diversity of such communities. During the last week of class, students will focus on data management and analysis and will produce a scientific report.

After the culmination of this class students will be better suited to conduct marine research, to assist other professors in their research and to produce scientific reports with the quality of a peer-reviewed paper.

SPECIFIC COURSE LEARNING OUTCOMES:

NUMBER	LEARNING OUTCOME	LEVEL
1	Learn to conduct scientific research using the scientific method	Final
2	Learn techniques to conduct research in the marine environment	Medium
3	Acquire analytical skills to manage, analyze and interpret data	Medium
4	Learn to write scientific papers	Final

COURSE CONTENTS:

Scientific method, experimental design, ecological monitoring routines, marine benthic communities, common organisms on intertidal and subtidal rocky habitats, metadata managing, exploring data, the art of scientific writing.

METHODOLOGY FOR THE INTEGRATION OF THEORETICAL AND PRACTICAL CONTENT

The teaching methodologies used to teach USFQ courses, following the philosophy of Liberal Arts, foster dialogue and facilitate the construction of knowledge through the continuous



exchange of ideas and experiences between professors and students. It is expected that in all courses the theoretical concepts will be linked to the professional practice and work contexts where students will perform in the future, with the intent to integrate activities and simulations of a diverse nature that promote the understanding of practical and realistic contexts.

COURSE EVALUATION:

CATEGORY	Points
Oral Presentations	12.5
Article Leading Discussion	12.5
Writing Exercises	10.0
Participation in Class (discussions)	10.0
Participation in the Field (engagement)	10.0
Quality of Field Data (field sheets, databases)	10.0
Field Report on El Pelado Marine Reserve	7.5
Scientific Report	15.0
Exam	12.5
Total	100.0

DESCRIPTIONS OF THE EVALUATION CATEGORIES:

Oral presentations: The goal of this presentation is to explore the methods for conducting marine research in rocky intertidal and subtidal communities. Groups of 2 students will choose a particular topic of interest among these categories: eco-physiology, biomechanics, diversity, productivity, habitat complexity and human impacts, and make a literature search to compile the information of the three most popular field methods used for that particular topic. The presentation should cover background information, as well as the hypothesis (or objectives) of their topic of interest. Text on each slide should be only an aid for you to remember the most important topics you want to communicate to your audience, thus avoid writing too long sentences or whole paragraphs. Acknowledge the sources of your work throughout the presentation. Please practice your talk before the presentation to time yourself and to stay within the 12 min limit. Speak to your audience loud and clear.

Article Leading Discussion: Groups of 2 students will choose a paper from the reading list. Students will lead a discussion, identifying the objectives of the study, its importance, the hypotheses and the experimental design chosen by the authors. Then, they will discuss about the suitability of the experimental design to test those hypotheses. Students leading the debate should engage the rest of the class with specific questions about the paper, with particular attention to alternate hypothesis or new ideas.

Writing Exercises: In order to prepare for writing the final report, students will perform during class writing exercises. These consist of reading two published articles and write the abstract of the first, and identify the main parts of the introduction and of the discussion of a second one.

Participation: In class, students are expected to be familiar with the readings for that particular day. They are also expected to actively participate during the discussions of the readings. In the field, students are expected to engage in the process of data gathering. Also, students are expected to gather data in a consistent and methodic manner and enter the data accordingly, the same day the information was collected. Students are expected to bring their computers for this purpose.



Quality of Field Data: Students will receive 5 points for the quality of the data of the field datasheets (they should contain all relevant information), and 5 points for the quality (precision) of the data entered in the electronic databases.

Field Report on El Pelado Marine Reserve (EPMR)

Students will submit a field report on the scuba trip at EPMR. Specific guidelines will be provided via D2L.

Scientific Report

Students will produce a scientific report in the format of a scientific paper of no more than 10 pages double-spaced (excluding tables, figures and Literature Cited) with the following sections: Abstract, Introduction, Methods, Results, Discussion, and Literature cited. Cite at least 10 papers (5 in the introduction, 5 in the discussion), following the format used by the Ecological Society of America journals <http://esapubs.org/esapubs/journals/ecology.htm> or using the guidelines provided in this class.

Exam

Students will take one exam, where they will be evaluated on the contents of the theory impaired during the first week, as well as on the student presentations and readings.

GRADING SCALE:

PERCENTAGE	GRADE	CONSIDERATION	POINTS
91-100	A	Excellent	4
81-90	B	Good	3
71-80	C	Intermediate	2
61-70	D	Deficient	1
< 61	F	Fail	0

MAIN BIBLIOGRAPHY:

1. Krenz, C., B. A. Menge, T. L. Freidenburg, J. Lubchenco, F. Chan, M. M. Foley, and K. J. Nielsen. 2011. Ecological subsidies to rocky intertidal communities: Linear or non-linear changes along a consistent geographic upwelling transition? *Journal of Experimental Marine Biology and Ecology* 409:361–370.
2. Blanchette, C., E. Wieters, B. Broitman, B. Kinlan, and D. Schiel. 2009. Trophic structure and diversity in rocky intertidal upwelling ecosystems: A comparison of community patterns across California, Chile, South Africa and New Zealand. *Progress in Oceanography* 83:107–116.
3. Pulgar, J., E. Poblete, M. Alvarez, J. Morales, B. Aranda, M. Aldana, and V. Pulgar. 2013. Can upwelling signals be detected in intertidal fishes of different trophic levels? *Journal of fish biology* 83:1407–1415.
4. Adkins, M. E., C. A. Simpfendorfer, and A. J. Tobin. 2016. Large tropical fishes and their use of the nearshore littoral, intertidal and subtidal habitat mosaic. *Marine and Freshwater Research* 67:1534–1545.



5. Gosnell, Js., and S. D. Gaines. 2012. Keystone intimidators in the intertidal: non-consumptive effects of a keystone sea star regulate feeding and growth in whelks. *Marine Ecology Progress Series* 450:107–114.
6. Alexander, M. E., J. T. Dick, and N. E. O'Connor. 2013. Trait-mediated indirect interactions in a marine intertidal system as quantified by functional responses. *Oikos* 122:1521–1531.
7. Docmac, F., M. Araya, I. A. Hinojosa, C. Dorador, and C. Harrod. 2017. Habitat coupling writ large: pelagic-derived materials fuel benthivorous macroalgal reef fishes in an upwelling zone. *Ecology* 98:2267–2272.
8. Duffy, J. E., J. S. Lefcheck, R. D. Stuart-Smith, S. A. Navarrete, and G. J. Edgar. 2016. Biodiversity enhances reef fish biomass and resistance to climate change. *Proceedings of the National Academy of Sciences* 113:6230–6235.

POLICIES:

All courses are governed by the USFQ Student Manual, which can be downloaded [here](#).

About electronic equipment: You're allowed to have electronics on, as long as you use them for taking notes.

Materials: For fieldwork ALWAYS bring hat, sunscreen, notebook, good shoes to do intertidal work (e.g. anti-slippery shoes), camera, id guides, reusable water bottle.

SCHEDULE OF ACTIVITIES:

DATES	TOPIC	READINGS
August 19 th	Content of the course and organization Scientific method Experimental design	
August 20 th	Intro to marine benthic communities Marine algae	Article 1; groups 2, 3 presenting
August 21 th	Exploring data Metadata managing	Article 2; groups 4, 5, 6 presenting
August 22 nd	Diversity Indices and Multivariate Analyses	Article 3; groups 7, 8 presenting
August 23 rd	Writing exercises Field Trip preparation	Article 4
August 24th – September 1st Field Trip	24th Travel to Canoa	
	25th Intertidal work: Cabo Pasado	Article 5
	26th Travel to Ayangué	
	27th Scuba/Snorkel at El Pelado Marine Reserve	
	28th AM: Intertidal work: La Chocolatera PM: Trip Salinas-Ayampe	
	29th Intertidal work: La Rinconada	Article 6
	30th Intertidal work: Machalilla	Article 7
	31st Intertidal work: La Playita	Article 8
September 2 nd	No class, relax!	
September 3 rd	Exam , The art of scientific writing (25), Data analysis and writing	



September 4 th	Data analysis and writing
September 5 th	Data analysis and writing
September 6 th	Data analysis and writing, Scientific Report Submission

This syllabus was reviewed and approved by the academic coordinator of the major/department, such that all sections should follow this syllabus. If it is necessary to make changes/adjustments to the syllabus, please ask the academic coordinator so that the approved changes/adjustments are reflected.