FISHERY BIOLOGY AND MANAGEMENT – MR250
SPRING 2017

Instructor: Allain Bourgoin
Office: Math/Science Office **Tel.:** 320-2480 ext.: 222
Office hours: Monday, Wednesday, Friday from 12h00 to 13h30 (or by appointment)
Lecture schedule: Monday, Wednesday, Friday at 10:00 **Room:** A-104

Prerequisite Courses: A "C" or better in marine biology (MR120) or oceanography (MR240) and college algebra (MS100) or instructor permission. It is strongly suggested that students undertake Introduction to Statistics (MS-150) beforehand or follow it in concomitance.

Course Description: The marine fisheries are the mainstay for the economy of a number of nations. This course will provide students with a worldwide overview of the marine fishing industry. The fundamental principles in assessing and managing stocks will be covered. To this effect, fishing techniques, life histories of major exploited taxonomic groups, methods of collecting fisheries data, stock assessment techniques, and management efforts will be discussed. A series of home assignments will accompany the theoretical content.

INSTITUTIONAL STUDENT LEARNING OUTCOMES:
(Ref: http://www.comfsm.fm/catalog/2016-2017/Catalog%202016-2017UPDATED8.pdf -- page 19)
COM-FSM graduates will demonstrate:

1. **Effective oral communication:** capacity to deliver prepared, purposeful presentations designed to increase knowledge, to foster understanding, or to promote change in the listeners' attitudes, values, beliefs, or behaviors.
2. **Effective written communication:** development and expression of ideas in writing through work in many genres and styles, utilizing different writing technologies, and mixing texts, data, and images through iterative experiences across the curriculum.
3. **Critical thinking:** a habit of mind characterized by the comprehensive exploration of issues, ideas, artifacts, and events before accepting or formulating an opinion or conclusion.
4. **Problem solving:** capacity to design, evaluate, and implement a strategy to answer an open-ended question or achieve a desired goal.
5. **Intercultural knowledge and competence:** a set of cognitive, affective, and behavioral skills and characteristics that support effective and appropriate interaction in a variety of cultural contexts.
6. **Information literacy:** the ability to know when there is a need for information, to be able to identify, locate, evaluate, and effectively and responsibly use and share that information for the problem at hand.
7. **Foundations and skills for life-long learning:** purposeful learning activity, undertaken on an ongoing basis with the aim of improving knowledge, skills, and competence.
8. **Quantitative Reasoning:** ability to reason and solve quantitative problems from a wide array of authentic contexts and everyday life situations; comprehends and can create sophisticated arguments supported by quantitative evidence and can clearly communicate those arguments in a variety of formats.

PROGRAM LEARNING OUTCOMES:
Upon completion of the COM-FSM Marine Sciences requirements, students will be able to:

1. Demonstrate fundamental knowledge of geological, geomorphological, physical, chemical, and biological oceanography.
2. Apply fundamental knowledge of marine sciences towards identifying and critically analyzing, and outlining potential solutions for local, regional and global problems relating to marine systems.
3. Apply the scientific process to formulate hypotheses, design experiments, and collect and analyze data from which valid scientific conclusions are drawn.
4. Communicate effectively, in written and oral forms, utilizing the language and concepts of marine science.

STUDENT LEARNING OUTCOMES (SLOS-Course and Specific): With 60% mastery
Students will be able to achieve the following learning outcomes:
CSLO 1. *The student will be able to relate the evolution of the world marine fisheries from ancient civilizations to the recent fishing trends.*
The student will be able to…

- **SLO 1.1** … to define the term "fisheries"; and highlight the major historical periods in the evolution of the world fisheries.

CSLO 2. *The student will be able to discuss the limits of productivity of exploited biological resources.*
The student will be able to…

- **SLO 2.1** … to sketch and comment the patterns of exploitation of a target stock and furnish examples of the "boom and bust" cycle when exploiting a given stock

CSLO 3. *The student will be able to recognize, describe, and list the various taxonomic groups of marine species exploited on a commercial basis.*
The student will be able to…

- **SLO 3.1** … to list the major taxonomic groups of exploited marine species; describe their life histories and their respective economic importance.
- **SLO3.2** to describe the notion of primary productivity and its link to the major world fisheries.

CSLO 4. *The student will be able to describe the major techniques and methods used in exploiting the marine resources.*

The student will be able to…

- **SLO 4.1** … to list and classify (passive versus active) various gears and fishing methods used to exploit the marine resources; and to discuss their impacts on the marine environment.

CSLO 5. *The student will be able to compile statistical data on the principal species or taxonomic groups landed in volume and value at the world, regional, and local levels.*

The student will be able to…

- **SLO 5.1** … to list the major regional and international fishery bodies mandated to compile the fisheries statistical data, (FAO; SPC; FFA; WCPFC; NORMA…); know basic fisheries statistics; and be capable of using search engines (library and through the web) to gather fisheries statistical data

CSLO 6. *The student will be able to differentiate between a biological population, a stock, and a cohort.*

The student will be able to…

- **SLO 6.1** … to compare and contrast between the notions of biological population, unit-stock, and a cohort; list methods commonly used to identify/delimit a given unit-stock; and to differentiate the exploited from the exploitable phases.

CSLO 7. *The student will be able to compare and contrast the Holistic and Analytical stock assessment models in population dynamics.*

The student will be able to…

- **SLO 7.1** … to draw and interpret a series of graphs representing the biological parameters used to apply the Holistic and Analytical stock assessment models; and to highlighting some strengths and weaknesses of each model

CSLO 8. *The student will be able to describe the work carried out by observers on board western tropical Pacific fishing vessels.*

The student will be able to…

- **SLO 8.1** … to describe the tasks of an observer on board a fishing vessel and explain how such data is useful for fisheries management.

CSLO 9. *The student will be able to list the major biological parameters used in stock assessment, notably: stock abundance, catch rates and fishing effort*

The student will be able to…

- **SLO 9.1** … to describe some major biological parameters used in stock assessment: abundance; fishing effort; age and growth; gear selectivity and recruitment; and mortality (natural and fishing)

CSLO 10. *The student will be able to list fisheries management tools and explain their use.*

The student will be able to…

- **SLO 10.1** … to list some major tools used in fisheries management and highlight conflicts that can arise amongst stakeholders when dealing with a common resource.

Course Content:

MARINE FISHERIES: AN INTRODUCTION

1. Defining Fisheries and History of Fisheries
2. Why Manage Fisheries

MARINE ECOLOGY AND PRODUCTION PROCESSES

1. Productivity and Fisheries
2. Transfer Along the Food Chain
3. Global Distribution of the Fisheries

FISHED SPECIES, LIFE HISTORIES AND DISTRIBUTION

1. The Classification of Organisms and Major Fisheries Resource Taxonomic groups
2. World Commercial Catches of Selected Fishes, Molluscs, Crustaceans and Other Taxonomic Groups

FISHING GEAR AND METHODS

1. Passive Gear (Static Fishing Gear)
2. Active Gear (Towed Fishing Gear)

3. Bycatch, discards and Conservation Approaches

STOCK ASSESSMENT
1. Stock or Unit Stock
2. Distribution, Abundance, and fishing effort
3. Collecting Data – Observers on board

STOCK ASSESSMENT MODELS
1. Holistic Models (Surplus Yield Models; Biomass Models)
2. Analytic Models (Virtual Population Analysis; Yield per Recruit Models)

FISHERIES MANAGEMENT
1. Management Objectives and Strategies
2. Fisheries Regulations
3. Improving Management and Conservation Measures

Required textbook:
The two main textbook used are on "reserve" at the library front desk.
Jennings S., M.J. Kaiser & J.D. Reynolds. 2001. Marine Fisheries Ecology. Blackwell Science Ltd., Oxford (England).

King M. 2007. Fisheries Biology, Assessment and Management. 2nd ed. Blackwell Publishing Oxford, UK. 382pp. **(Available at the book store)**

Required Course Materials: Each student must have a hand calculator with integrated statistical functions.

Other References:
Barnes R.S.K. and R.N. Hughes. 1999. An Introduction to Marine Ecology. 3rd ed. Blackwell Science. Oxford, England.

Berrill, M. 1997. The Plundered Seas: Can the World's Fish be Saved? Sierra Club Books. San Francisco, CA. (USA). 208pp.

Cailliet G., M.S. Love, and A.W. Ebeling. 1986. Fishes: A Field and Laboratory manual on Their Structure, Identification, and Natural History. Waveland Press, prospect Heights, Illinois. (USA)

FAO -----. FAO Fisheries and Aquaculture Department Homepage:. (http://www.fao.org/fishery/en)

FAO 2016. The State of World Fisheries and Aquaculture (SOFIA). FAO Fisheries and Aquaculture Department. FAO, Rome, Italy.(see http://www.fao.org/fishery/en)

FAO 2016. FAO Yearbook. Fisheries and Aquaculture Statistics 2014.(http://www.fao.org/fishery/publications/yearbooks/en)

FSM 2011. Annual Report to the Tuna Commission (WCPFC). Part 1: Information on Fisheries, Research, and Statistics for the FSM. Scientific Committee: 7th regular session of the WCPFC. (WCPFC-SC7-AR/CCM-06) 15 pp. (http://www.spc.int/fame/en/fame-digital-library)

Gillett R. 2016. Fisheries in the Economies of Pacific Island countries and Territories. Pacific Community, Noumea, New Caledonia.

Haddon M. 2011. Modelling and Quantitative Methods in Fisheries. 2nd ed. Chapman & Hall/CRC Press,. Boca Raton, FL (USA)

Levinton J.S. 2001. Marine Biology. Function, Biodiversity, Ecology. 2nd ed. Oxford University Press. New York (USA).

SPC (Secretariat of the Pacific Community). 2015. FAME (SPC Division of Fisheries, Aquaculture & Marine Ecosystems). (http://www.spc.int/fame)

SPC (Secretariat of the Pacific Community) 2015. Pacific Island Regional Fisheries Observers (PIRFO). (http://www.spc.int/oceanfish/en/ofpsection/fisheries-monitoring/observers)

Other references and reading assignments covering various fishery biology and management issues will be given in class during the semester.

Instructional Cost: Buy a hand calculator – with statistical functions.

Methods of instruction: The course will be taught by lectures extensively supported by PowerPoint presentations. Handouts will be furnished for each covered chapter. These handouts will be placed on WIKI. The students are asked to print the notes out and bring them to class. These notes will guide the students throughout the lectures and will be a useful tool to prepare the exams and the various home assignments. The course will include a number of problem solving assignments relative to population dynamic issues (fish stock assessment).

Evaluation: Class quizzes and home assignments; 4 tests (including the mid-term and final exams).

Grading:

Homework, quizzes…	20%		
Exams			
Exam 1	20%	Mid-Term	20%
Exam 3	20%	Final exam	20%

Grading scale:

89.5-100%	A
79.5-89.4%	B
69.5-79.4%	C
59.5-69.4%	D
below 59.5%	F

Class Attendance: The COM-FSM attendance policy is described on page 117 of the General Catalog 2016-2017 (http://www.comfsm.fm/catalog/2016-2017/Catalog%202016-2017UPDATED8.pdf):

"Regular and prompt class attendance is expected of all students. It shall be the student's responsibility to inform the instructor(s) of anticipated or unavoidable absences and to make up work missed as a result of absences. Mandatory attendance is at the discretion of the instructor provided that conditions for the attendance are included in the course syllabus and communicated to the students on the first day of class."

My attendance policy is as follow: ***Students who are absent for more than six classes, will automatically be dropped from the course. The total missed classes include unexcused and excused absences, such as sickness, funerals, and any other circumstances. LATE ARRIVALS COUNT AS AN ABSENCE.***

In order to reward the students who always show up on time and never miss class nor laboratory sessions, the following additional grades will be awarded in the following way.

0 absence	*3% added to the final grade*
1 absence	*2% added to the final grade*
2 absences	*1% added to the final grade*
3 absences or more	*no bonus*

Exams: All students are obligated to write each of the exams. If a student misses an exam, he or she will automatically receive a zero (0) for that specific exam unless the student was sick and furnished a written note signed by a medical expert as proof of sickness. In this case, the other three (3) tests will be re-weighed accordingly. Please note that there are no "make-up tests".

Assignments (Quizzes, homework…): Details of home assignments, quizzes will be given in class.
It is the responsibility of each student to assure that he or she completes and returns all assignments given by the professor. Due dates will be indicated for each assigned work. After this due date, the work will no longer be accepted and the student will automatically receive a zero (0) for the specific assignment not turned in. **All assignments are due at the beginning of the class/lab period. I will not accept any late assignments.**

Academic Honesty: *To ensure the integrity of the educational process and the institution, the College encourages academic honesty, and therefore does not condone cheating, plagiarism, or any related form of academic dishonesty which prevents an instructor from being able to assess accurately the performance of a student in any facet of learning. Students found guilty of academic dishonesty, cheating, plagiarism, and facilitating academic dishonesty will be liable to dismissal or suspension from the College.* . (p.115 of the General Catalog 2016-2017: (http://www.comfsm.fm/catalog/2016-2017/Catalog%202016-2017UPDATED8.pdf)

Graffiti and betel nut: Any student found scribbling on desks or chewing betel nut in classes will be liable to dismissal or suspension from the class. (see below for obligations relative to the Pohnpei State betel nut policy effective January 1, 2017)

> Peilapalap, Pohnpei: September 16, 2016 - On Friday September 16, 2016 Governor Marcelo Peterson signed the historic BETEL NUT legislation that was unanimously and recently passed by the Pohnpei State Legislature.

The historic legislation prohibits anyone to consume or chew betel nut in government offices, buildings, vehicles, boats, ships and other public gathering settings including Churches and traditional houses (Nahs). The bill also prohibits businesses to sell betel nut to minors under the age of 18. Furthermore, anyone who is in violation of this law will be fined, put in jail or both.
The Governor stated that this legislation was long overdue and is necessary due to the increasing number of cancer related cases and deaths in the State of Pohnpei. He also mentioned that Pohnpei is still under a State of Emergency for Non Communicable Diseases (NCD) and therefore will require the State leadership, community leaders and local stakeholders to work together in reversing the crisis. Furthermore, the Governor tasked the State Department of Health Services and its partners to start with the education and work with relevant State Departments and agencies in enforcing the new Betel Nut law.

The FSM National Cancer Control and Non Communicable Disease Program Manager, Mr. Xner Luther who represented the FSM Secretary of Health Magdalena Walter praised the Governor and the State Legislature for their leadership in tackling the NCD crisis and for setting the standard for Cancer related legislation.

Be on time in class: The official way to synchronize clocks on campus is to refer to:
http://www.timeanddate.com/worldclock/micronesia/kolonia
This is the official time based on atomic clocks in Boulder, Colorado. Synchronize your watch to that time and show up on time in class. If you are late, you might face a "locked door" and will not be able to assist class. **Do not forget that late arrivals count as "absences".**

Electronics: None of the students will be allowed to use electronics in class unless approved. This means that there will be NO USE OF Laptops, MP3s IPods, IPads, Iphones, Tablets etc. Equally, I will not tolerate that students have "earphones" dangling from their ears or around their necks. All these gadgets must be stored away before class starts.

FISHERIES BIOLOGY AND MANAGEMENT--MR250
TENTATIVE COURSE SCHEDULE – SPRING 2017

Week 1 (Jan 9- Jan 13) (Jan 13- Last day add/drop)	• Syllabus (Monday, January 9) • Marine Fisheries: an introduction **Readings: Ch 1 (Jennings, p.1-20); Lecture notes**
Week 2 (Jan 16 – Jan 20)	• Marine Fisheries: an introduction (cont) **Readings: Ch 1 (Jennings, p. 1-20); Lecture notes**
Week 3 (Jan 23 – Jan 27)	• Marine ecology and production processes **Readings: Ch 1 (King); Lecture notes**
Week 4 (Jan 30 – Feb 3)	• Fished species: life histories and distribution **Exam 1 (Wednesday, Feb 1)** **Readings: Ch 2 (King) Lecture notes**
Week 5 (Feb 6 – Feb 10)	• Fished species; life histories and distribution (cont) **Readings: Ch 2 (King); Lecture notes**
Week 6 (Feb 13 – Feb 17)	• Fishing gear and methods **Readings: Ch 3 (King); Lecture notes**
Week 7 (Feb 20 – Feb 24)	• Fishing gear and methods (cont.) **Readings: Ch 3 (King); Lecture notes**
Week 8 (Feb 27 – Mar 3) (Feb 27, 28 – mid-terms)	**Mid-term evaluation (Monday, Feb 27)** • Stock Assessment: Unit stock; cohort **Readings: Ch 4 (King); Lecture notes**
Week 9 (Mar 6 – Mar 10)	• Stock Assessment: Distribution and Abundance **Readings: Ch 4 (King): Lecture notes**
Week 10 (Mar 13 – Mar 17) (March 17 – Last day to "W")	• Stock Assessment: Fishing Effort **Readings: Ch 4 (King); Lecture notes**
Week 11 (Mar 20 – Mar 24)	• Collecting Data: observers on board **Reading SPC website; Lecture notes**
Week 12 (Mar 27– Mar 31) (March 30 – COM-FSM founding day) (March 31 -Holiday: cultural day)	• Collecting Data: observers on board **Readings: SPC website; Lecture notes** **Exam 3 (Wednesday, March 29)**
Week 13 (Apr 3 – Apr 7)	• Exam 3- revision • Stock Assessment Models **Readings: Ch 4 (King); Lecture notes**
Week 14 (Apr 10 – Apr 14) (Apr 12-14 Easter Recess & Good Friday)	• Stock Assessment: Models **Readings: Ch 4 (King); Lecture notes**
Week 15 (Apr 17 – Apr 21)	• Fisheries Management **Readings: Ch 5 & 6 (King); Lecture notes**
Week 16 (Apr 24 – Apr 28)	• Fisheries Management (cont.) **Readings: Ch 6 (King); Lecture notes**
Week 17 (May 1 – May 5) (May 2 – last day of instruction) (May 3, 4, & 5: final exams)	• Course revision (May 1) • **Final Exam (May 3, 4, & 5)** • Deadline for final grades (May 8)
Week 18 (May 8 – May 12) (May 10 – Holiday (FSM Const. day) (May 11 – Graduation)	• Graduation (May 11)