ENST 413: Sustainable Aquaculture and Food Security
Units: 4
Fall 2020, MW 2-3:20
Location: Online via Zoom/Blackboard

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(*he/him/his*)
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Zoom Office Hours: Tue 1-2 or by apptmt

Course Description

Global population is on a trajectory towards 10 billion by the year 2050, intensifying the need for sustainable approaches to food production and security. Aquatic systems including the oceans represent more than 99% of the biosphere and offer vast potential for offsetting sustainability challenges and limitations inherent in terrestrial agriculture and livestock production. Seafood from marine and freshwaters offer a valuable nutritional source; however, yield from wild-capture fisheries have attained a maximum. In this course we explore the potential and problems of aquaculture, the directed production of fish, invertebrate and plants from marine and freshwater aquatic systems, to advance sustainable food production and security. We will address the potential for aquaculture to benefit sustainable food production as well as highlight salient challenges for aquaculture from the scientific and technological, social, economic and policy perspectives.

Learning Objectives and Outcomes

Through this course students will be able to:
* Identify the major biological and technological challenges for aquaculture production of marine and freshwater animals/plants
* Describe the key components of food security
* Identify the potential environmental impacts and resource demands associated with aquaculture
* Explain social and economic factors that have supported the expansion of aquaculture in some geographic regions, while stifling it in others
* Analyze how public perception, policy, and permitting process has shaped aquaculture production in the US and California
* Analyze the capacity and limitations for multiple forms of aquaculture to contribute to food security and sustainability (environmental, social and economic) objectives
* Apply primary literature databases and citation manager tools to prepare and annotated bibliography
* Generate a critical review of the potential for a chosen segment of aquaculture production to meet sustainability and food security objectives

Recommended Preparation

Completion of ENST 100 recommended

Course Notes

This course will use Blackboard for communication, information and turning in assignments. Lecture slides will be made available after the lecture is given. Additional readings will be assigned throughout the semester, and these will be announced on Blackboard as well as in class. Sometimes computers will be used in class to work with real life data in Excel and run simple simulations. This course includes substantial in depth reading and critical analysis outside of lecture, as it is a four-unit course.

Required Readings and Supplementary Materials

All required readings materials will be provided through Blackboard and/or USC Library electronic access.

Communication and Course Technology

- **Blackboard web portal**: Course communications including announcements, course materials, lecture notes, assignments, grade postings, discussions, instructions and submission of completed assignments will be conducted via **Blackboard** (https://blackboard.usc.edu). Students are responsible for checking the course website regularly. ***Please notify the instructor in the event of any mistakes or difficulties accessing materials.***

- **Zoom teleconferencing:** Synchronous lectures activities (and office hours) will occur via **Zoom**.

- **Email**: If you have questions or need to schedule an appointment (if you are unable to visit during scheduled office hours) please contact the instructor via email. The clearer and more professional your email inquiry, the easier it is for us to address your needs. **Therefore, please read and recheck your message for clarity before sending.** We try our best to respond to emails within 24 hrs. However, if you do not receive a response within that time you may send a follow up inquiry. **Note**: *Please consult the provided course resources before your email (Blackboard, syllabus, assignment instructions, announcements, etc.) as these resources can answer many of your questions. Nevertheless, do not hesitate to contact me if you still need assistance!*

  - **USC technology support:**
    - Zoom information for students
    - Blackboard help for students
    - Software available to USC Campus

Assignments & Point Values:

Assignment	% of Grade
Exam 1	20%
Exam 2	20%
Bibliographic Database/Citation manager activity	10%
Aquaculture species profile	10%
Group Project (Paper & Presentation)	20%
In-class/take home activities, readings/discussions	20%

Final grades will be determined on the following scale (*may be adjusted based upon class progress*):

Grade	Percent	Grade	Percent
A	95-100	C	73-76
A-	90-94	C-	70-72
B+	87-89	D+	67-69
B	83-86	D	63-66
B-	80-82	D-	60-62
C+	77-79	F	59 and below

Academic Conduct:

Course Community and Discussion Conduct:
- Share responsibility for including all voices in the conversation.
- Listen respectfully.
- Be open to changing your perspectives based on what you learn from others.
- Understand that we are bound to make mistakes in this space.
- Understand that your words have effects on others.
- Take pair/group work seriously.
- Understand that others will come to these discussions with different experiences from your own.
- Make an effort to get to know other students.
- Understand that there are different approaches to solving problems.

Plagiarism: Presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, "Behavior Violating University Standards" policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, policy.usc.edu/scientific-misconduct.

Course-specific Policies

Attendance and participation: Students are strongly encouraged to attend synchronous course activities (Zoom meetings). Active participation in class is necessary. However, synchronous sessions will be recorded and available through Blackboard. Students who miss Zoom meetings are responsible for finding out about any in-class announcements and activities, and must contact the instructor for alternate assignments.

Late assignments: Late assignments must be uploaded to Blackboard/TurnItIn (as specified for each assignment or activity). Unless otherwise specified late assignments incur a 5% starting 15 minutes after the deadline and 5% additional for each 24 hrs late.

Missed exams: UNPLANNED ABSENCES: You may be excused from an exam only in the event of a documented illness or emergency as outlined by university policy, with notification to the instructor within 48 hours. An invalid excuse, or the excuse turned in late, will result in a score of zero for the activity missed. If you miss the final examination and have provided a valid medical excuse within 72 hours of the examination time, a final course grade of incomplete (IN) will be recorded, and you will be permitted to take a make-up final examination during the following semester. If you have an emergency on exam day, please contact the instructor as soon as you are able (preferably, before the exam).

PLANNED ABSENCES: Students that miss an examination or graded activity for observance of a religious holy day should be aware of the University's policy on such absences, published at: http://orl.usc.edu/religiouslife/holydays/absences.html. If the absence is approved as determined by the USC Office of Religious Life, a reasonable accommodation will be provided. If you have any anticipated exam date conflicts due to athletic schedules or religious holidays, you **must** email the instructors *two weeks in advance* to see if alternative arrangements can be made (under reasonable circumstances). Otherwise, make-up exams will not be given except in extreme emergencies (see above).

Policy on Re-grades: Assignments will be graded in the context of expectations set by an initial evaluation of all student responses. If you feel that an error was made in the grading of an examination or lab activity, you must: 1) Prepare a printed statement explaining why you feel your grade was incorrect, and 2) submit this and your original examination to your instructor within one week of the time the examination or assignment was returned to you. Your entire exam or assignment may be re-graded and, as a result, your grade may increase or decrease from a requested re-grade. No frivolous reasons will be accepted for requesting grade changes.

Online Learning Experience

Current conditions have added new challenges to the semester. Although Fall 2020 will be atypical, I will work to engage each and every one of you to the best of my abilities! However, you should take steps to make the experience as beneficial for you as possible. If you have logistical or technology related issues that are impacting your learning experience and ability engage with the class (such as internet connectivity, or other obstacles) you can contact me and I will try to help or will refer you to someone that may assist you.

Zoom/online live meeting etiquette

A few reminders for getting the best experience in online lecture/discussion:
- PLEASE NOTE: synchronous session will be recorded and distributed on Blackboard
- Please mute your microphone when not speaking

- Use of webcam is encouraged and preferred. Please dress appropriately for a classroom environment
- You can use virtual backgrounds if you prefer to keep your home background environment private
- Headphones with a microphone are effective in minimizing interference from background noise
- You can use the Zoom chat or hand raise functions for questions/comments during sessions
- Come to synchronous meetings prepared

Synchronous session recording notice
Synchronous sessions will be recorded and provided to all students asynchronously via Blackboard.

Sharing of course materials outside of the learning environment
Reminder: USC policy prohibits sharing of any synchronous and asynchronous course content outside of the learning environment:

Course Schedule

Week of:	Topics/Daily Activities	Readings
Aug 17 *Week 1*	**Introductions** Wed, Aug 19, WIES Webinar (kelp culture technology)	*For next week, FAO 2018 Intro material (Pages 2-6, 17-29)*
Aug 24 *Week 2*	**Aquaculture in the future of food and food security** **Aquaculture systems overview**	*Food security basics sheet* Tidwell *Aquaculture Systems* Ch 4
Aug 31 *Week 3*	**Biological considerations**: Species selection and evaluation, hatcheries	Morais et al 2016 *Rev in Aquacult*
Sep 7 *Week 4*	*Monday, Sep. 7 Labor Day Holiday, No class* **Broodstock, genetics, breeding programs** *Sep 9, Guest: Dr. Francis Pan*	Gjedrem 2016 +TBA Dunham Ch. 7 *Genetics*
Sep 14 *Week 5*	Environmental considerations: Resource use/potential impacts	Edwards et al. 2015, *Aquaculture* +TBA
Sep 21 *Week 6*	**Feed source issues**: FiFO, feed efficiency, and no-feed systems Aquaculture Species profiles due	You & Hedgecock 2018, *R. in Aquacult*. Froehlich et al 2018 *PNAS* Tacon and Metian 2015
Sep 28 *Week 7*	Kelp culture for food and fuel, *Sep 28, Guest: G. Molano* **Wed Sep 30, Exam 1**	*Schiel and Foster Ch. 11* *Schiel and Foster Ch. 2,3*
Oct 5 *Week 8*	**Sustainability/resilience under environ. change** Resilience to environmental, climate/ocean change	Froehlich et al 2018, *Nat Ecol Evol*
Oct 12 *Week 9*	**Public perceptions**, *Oct 14, Guest: Kim Thompson,* Certification programs, traceability, labor/justice	Froehlich et al 2016 *PLoS* +TBA
Oct 19 *Week 10*	**Regulation and Governance (CA-US-Global)**	Knapp and Rubino, 2016 Davies et al 2019
Oct 26 *Week 11*	**Social impacts and food security policy tools** *Oct 28 Guest: Dr. William. Leach*	Nakamura et al 2018
Nov 2 *Week 12*	**Restoration and conservation aquaculture** **Wed Nov 4, Exam 2**	Gentry et al 2019 *Rev in Aquaculture*
Nov 9 *Week 13*	*Group presentations*	
Nov 18	**Finals week-written projects due**	

Readings key:
- Required reading.
- Required reading for a guest speaker visit (please read before class!).
- Optional supplemental reading (may be useful in clarifying other readings/concepts)

Academic and Student Support Systems

Counseling and Mental Health - (213) 740-9355 – 24/7 on call; studenthealth.usc.edu/counseling
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call; suicidepreventionlifeline.org
Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL), press "0" after hours – 24/7 on call; studenthealth.usc.edu/sexual-assault. Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED) - (213) 740-5086 | Title IX – (213) 821-8298; equity.usc.edu, titleix.usc.edu. Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298; usc-advocate.symplicity.com/care_report. Avenue to report incidents of bias, hate crimes, and microaggressions to the Office of Equity and Diversity |Title IX for appropriate investigation, supportive measures, and response.

The Office of Disability Services and Programs - (213) 740-0776; dsp.usc.edu. Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

USC Campus Support and Intervention - (213) 821-4710; campussupport.usc.edu. Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity at USC - (213) 740-2101; diversity.usc.edu. Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call; dps.usc.edu, emergency.usc.edu. Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call; dps.usc.edu
Non-emergency assistance or information.