

Aquaculture and the Environment (ENV 319A/719A/719)

Fall 2021; M, W 1:45-3:00 (Bookhout Conference Room)

<https://duke.zoom.us/j/96796376539?pwd=UUZ30TU3aXR6MUN1SGY5VkVUR1RRZz09>

Instructor: Zackary Johnson <zij@duke.edu>

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Area of Knowledge: NS Modes of Inquiry: W, STS

Synopsis of course content:

Describing the major environmental, social and economic drivers of increasing global aquaculture, with a focus on marine systems. Quantitative evaluation and comparison of the range of species for aquaculture, locations where operations occur, operational aspects including environmental impacts and management considerations. Investigation of alternative approaches and potential future areas for aquaculture expansion as well as social, economic and technical barriers to implementation.

Text: *Aquaculture: An introductory text*. Robert Stickney (ISBN 978-1786390103):

<https://ebookcentral.proquest.com/lib/duke/detail.action?docID=6273895>

Other assigned readings from *Aquaculture Ecosystems: Adaptability and sustainability* Saleem Mustafa (ISBN 978-1118778531) and *Environmental best management practices for Aquaculture* Craig Tucker (ISBN 978-0813818672). Other handouts and companion reading provided.

Presentations: Grad: ~10 min final presentation; UG: ~1 page summary of one of the presentations; up to 2 short presentations on journey/results from shrimp farming

Format: Multimodal and experiential! → Lectures (live, or recorded as necessary); supplementary videos; discussions (online/in-person); in-class (online/in-person) working sessions; field trips (during class period); experiential learning; guest lectures. NOTE – we will start with in-person meetings, but future meetings are situationally dependent

Grading:

15% “Field Trip” write-ups

15% In-Class Assignments – analyses, Pecha Kucha, discussion, etc.

10% Presentation / Write-up

10% Shrimp Experiment

50% 3x short-papers (30% drafts; 10% comments on others; 10% revision)

Attendance:

Participation is an important aspect of the course and therefore attendance is compulsory, if possible. Students with planned absences (e.g. religious observances, varsity athletic participation, conferences) must notify the instructor 1 week in advance. Students with excused unplanned absences (e.g. illnesses or extraordinary personal circumstances) should notify the instructor following standard Duke policies outlined here: <http://trinity.duke.edu/undergraduate/academic-policies/illness>

The dynamic nature of COVID means that we should be prepared for change. We will start the class in-person and all ENV319A/719A students are expected to attend in-person. If the situation changes, then we will move the entire class online.

Field Trips: All field trips are scheduled to be during the class period. When possible, students enrolled in ENV719 (Durham based students) will be given opportunities to engage (via video) or if not possible, alternative field trips will be provided (e.g. self-guided or 'make-up' field trip days – e.g. weekends). Students can miss 1 fieldtrip without consequence.

Objectives:

- To identify major drivers of increasing global marine aquaculture and the major countries and organisms involved
- To compare the challenges and opportunities associated with different species or types of aquaculture including how aspects of basic biology and ecology impact application in traditional aquaculture systems, integrated multi-trophic aquaculture, nutrient remediation or blue carbon stocks or others
- To assess current societal impacts on present and potential future expansion of marine aquaculture including environmental concerns/sustainability, (sea)food security, policy/management and cultural aspects

Topics (with Stickney chapter #):

Setting the stage: major global drivers (1)

Historical context; major countries involved; major organisms cultured

Operational Aspects: Types of culture systems, water/energy use; feed (2, 3 & 7)

Challenges: operational and impacts (water quality, diseases, biodiversity) (4&5);

Alternative systems: multi-trophic, nutrient remediation, blue carbon, etc. (9)

(Sea)food Security

Case study in microalgae

Policy/management, regulations overview and cultural aspects

Management

Presentations

Potential In-Person Field Trips

Algae Farm

Duke Aquafarm (Oyster Farm)

Aquarium

Sturgeon Farm

Williston Oyster Hatchery

Eastern NC Producers Meeting

Major Themes/Roughly by Week

Introduction to active learning and class structure /Historical Context

Introduction to Aquaculture – setting the stage

Major Countries and Organisms

Operational Aspects – types of systems/water/feed

Environmental Impacts – Bad

Environmental Impacts – Good

Domestic & NC Strategy/Policy
Policy/Management/Social
Geospatial considerations
Case study in algae
Case study in oysters

Preliminary Paper Topics/ Preliminary Due Dates

Sept 10: History or Country or Organisms

Oct 18: Environmental Impacts

Nov 8: Choose your own adventure! (White paper)