**BIOL221 Seafood Forensics FALL 2020**

**COURSE DESCRIPTION:** Primarily this is a course about how to do science. How to develop scientific hypothesis, perform experiments, analyze data, write manuscripts, and publish results in a peer-reviewed journal. Along the way students will develop laboratory and general science skills and learn about fisheries and seafood sciences. This is meant to be an introduction to research: students are not expected to have any prior research experience. The science will be focused on using forensics sciences (primarily DNA barcoding) to quantify seafood mislabeling (e.g., farm raised tilapia sold as wild caught salmon). Additional topics covered include seafood supply chains and markets, fisheries management, over-fishing and its impact on marine ecosystems, and the importance of food labeling in human health.

**Instructors:**

Meggan Alston, meggan.alston@unc.edu

[Dr. John Bruno](http://johnfbruno.web.unc.edu/), jbruno@unc.edu

**Undergraduate LAs (Learning Assistants):**

Gloria Nzuzi, gnzuzi@live.unc.edu

Jaden Skelly, jj24601@live.unc.edu

Makala Wile, makala@live.unc.edu

Emily Ruiz Escobar, emilyre@live.unc.edu

**COURSE MEETINGS:**

Weekly remote class meeting via Zoom: Thursday 11:30 until 2pm (ish)\*

Lab in Wilson 111: TBD via student sign up: The in-person lab work will be optional. To meet UNC-CH COVID19 health policies, we will limit labs to 5 students at a time, plus one teaching staff. So there will never be more than 6 people in the classroom at a given time.

**SAKAI SITE:** You need an [onyen](https://itsapps.unc.edu/improv/#UserCreateOnyenPlace:createOnyen) to log on. Everything except the discussion board will be on the Sakai site. The syllabus, schedule, readings, links to training videos, updates and announcements, etc. It is your responsibility to check it regularly. At least daily.

**TEXT**: There is no textbook required for this course. Instead, reading assignments will come from the primary literature, news articles, and the instructor.

**ADDITIONAL REQUIREMENTS**: Basic knowledge of biology as demonstrated by a B or above in BIOL 101.

**LAB EXERCISES:** We will collect in-class assignments from time to time. These will often be based on the discussions we have about scientific literature in the field but could also relate directly to your research project.

**FINAL PAPER AND PRESENTATION:** You will write up your results in a individual (non-group) paper at the end of the semester. This final paper will take the place of a final exam in the course. In addition, you will give a scientific talk on your findings to the group.

**WHAT YOU SHOULD BRING TO CLASS EVERY DAY: (Ignore for 2020!)**

1. Your lab notebook

2. Computer

3. Writing utensil

4. Enthusiasm and creativity!

**COURSE GOALS**

**To introduce you to the process of science.**

The lecture and the reading material will provide the basic content. You will gain hands on experience with techniques in molecular biology, learn how to formulate hypotheses, and design experiments to test them. You will read scientific literature and learn to write like a scientist. After this class, you will be prepared to do research in a lab on campus and to build upon this content with Biol202, Biol201, Biol205 and upper level courses in the Department of Biology.

When you ***Do the Science*** you will acquire basic laboratory techniques and skills needed to use DNA barcoding to determine the frequency of seafood mislabeling. You will develop a novel, hypothesis driven question, design an experiment that allows you to answer it, collect data, and interpret your findings.

When you ***Share the science*** you will write a paper / manuscript and give a talk with your lab partners to the class and members of the local community about your science.

You will ***Understand and communicate the relevance of the science***. For example, you will read and discuss journal articles on seafood mislabeling and marine conservation to understand the application of the science you are doing.

**EXAM**: There will be one mid-term given during the session. For this exam, you will need your PID number as identification on your exam sheet. Additionally, you may be asked to verify your identity, so it is required that you bring your one-card to each exam. Failure to produce a one-card or other picture ID if asked may result in a zero on that exam. Test material to study: lab note book, lab exercises, reading, homework, power point slides, learning objectives, and problem sets. To succeed in this class, it behooves you to take each reading/homework seriously and actively engage in all class discussions.

**GRADING**

**Lab: Your final average is calculated:**

Total for the semester = (0.35 x lab exercises\*) + (0.20 x mid-term) + (0.20 x final paper) + (0.15 x final presentation) + (.10 x quizzes)

***Note we may have to modify depending on how things on campus progress this semester!***

\*participation, in-class assignments, written proposals, lab notebook checks

**In general, the scale for each letter grade comes very close to a 10-point scale. However, we reserve the right to change that scale since it is impossible to predict the difficulty level of any particular test. We will keep you updated about the estimated scale as the course moves along.**

**DIGITAL ETIQUETTE**

This course will require you to use your laptop during class time. While we recognize that you are an excellent multi-tasker, research suggest that your peers are not. Please be respectful of your classmates and restrict your use of digital devices to course content. If we see that you or your peers are distracted, we will ask you to put your devices away and you may forfeit your ability to earn participation points that day. We understand that your devices connect you to your friends and family (a wonderful thing!) but the classroom should be a place apart, however briefly (even if it seems like an eternity to you), from the outside world and distractions. You will learn more if you concentrate on the course while you are here and your classmates will thank you for not impeding their ability to learn.

**DIVERSITY STATEMENT**

The Department of Biology values the perspectives of individuals from all backgrounds reflecting the diversity of our students. We broadly define diversity to include race, gender identity, national origin, ethnicity, religion, social class, age, sexual orientation, political background, and physical and learning ability. We strive to make this classroom and this department an inclusive space for all students.

***This course will enable students to meet the following goals as part of the General Education curriculum:***

# Natural Scientific Investigation

Students learn how to make and interpret scientific descriptions and explanations of the natural world, practice the skills of scientific inquiry, and evaluate scientific evidence within the contexts of both scientific communities and society.

**Questions for Students**

1.       What rules govern the natural world and how are they discovered, tested, and validated?

2.       What is distinctive about the approach to understanding employed in the natural sciences?

3.       What challenges are encountered in making measurements of the natural world?

4.       What are the limits of investigation in the natural sciences?

**Learning Outcomes**

1.       Demonstrate the ability to use scientific knowledge, logic, and imagination to construct and justify scientific claims about phenomena, including validation through rigorous empirical testing.

2.       Analyze and apply processes of natural scientific inquiry as dictated by the phenomena and questions at hand. These include generating and testing hypotheses or theories; using logic and creativity to design investigations to test these hypotheses; collecting and interpreting data; making inferences that respect measurement error; building and justifying arguments and explanations; communicating and defending conclusions; revising arguments and conclusions based on new evidence and/or feedback from peers; and synthesizing new knowledge into broader scientific understanding.

3.       Evaluate science-related claims and information from popular and/or peer-reviewed sources by examining the relationship between the evidence, arguments, and conclusions presented and by assessing consistency with existing knowledge from valid and reliable scientific sources.

4.       Identify, assess, and make informed decisions about ethical issues at the intersections of the sciences and society.

**Recurring Capacities**

Focus capacity classes sustain the **recurring capacities** of inquiry that guide the general education mission. As appropriate to the course’s topic, each class should:

·         Pose problems and questions that require systematic thinking about evidence, argument and uncertainty;

·         Consider its content in the context of human difference between and within societies; the full range of legitimate debate in its field; and/or change over time

·         Require

o   Writing totaling at least 10 pages in length, or the intellectual equivalent.

o   Presenting material to the class, small groups, or the public through oral presentations, webpages, or other means that enable corroboration of fact and argument.

o   Collaborating in pairs or groups to learn, design, solve, create, build, research or similar.

**Research and Discovery**

Student immerse themselves in a research project and experience the reflection and revision involved in producing and disseminating original scholarship or creative works.

**Questions for Students**

1.       How do I establish my point of view, take intellectual risks, and begin producing original scholarship or creative works?

2.       How do I narrow my topic, critique current scholarship, and gather evidence in systematic and responsible ways?

3.       How do I evaluate my findings and communicate my conclusions?

**Learning Outcomes**

1.       Frame a topic, develop an original research question or creative goal, and establish a point of view, creative approach, or hypothesis.

2.       Obtain a procedural understanding of how conclusions can be reached in a field and gather appropriate evidence.

3.       Evaluate the quality of the arguments and/or evidence in support of the emerging product.

4.       Communicate findings in a clear and compelling ways.

5.       Critique and identify the limits of the conclusions of the project and generate ideas for future work.

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