UNIVERSITY OF SOUTHERN MAINE

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Hours: TBD

BIO 621 Environmental DNA Seminar
Course Syllabus

Course Meetings:	Friday, 11:00 AM – 1:30 PM
Course Mode:	Officially In-Person but remote for the first 2 classes
Course Location:	Luther Bonney, room 402, Portland campus

Materials & Books

Required
- Required peer-review readings will be provided
- You will also need a general biology textbook (such as Campbell)

Supplemental
- I strongly recommend using a reference book for writing in biology, such as, McMillan, V.E. and McMillan, V., 2012. *Writing papers in the biological sciences*. Older versions are fine.

Technology Requirements
- We will be using Brightspace
- See the "Technology" section for information on Brightspace's tech requirements.

Course Description

Environmental DNA (eDNA) is organismal DNA that is collected from the environment in samples such soil, water, or air rather than being directly collected from the organism. In this course, we will explore various applications of eDNA technology for the detection of species and the assessment of biodiversity in the field of ecology and environmental science. We will also look at human health applications of eDNA technology for the detection of pathogens and microbiome health. As a Capstone class, this course adheres to the basic principles within the USM Capstone framework. This course is designed to give you experience in thinking across the biological sub-disciplines of ecology and molecular biology and challenge you to utilize the knowledge you have gained as a Biology major at USM.

Learning Outcomes
Drawing on the specialized knowledge gained through your biology curriculum, students will

1. **Design** and lead a thoughtful discussion that explores eDNA technology.
2. **Analyze, interpret, and communicate** recent scientific advances from peer-reviewed research articles.
3. **Teach** your fellow classmates eDNA concepts through short demonstrations.
4. **Explore** ways in which eDNA technology connects with your non-academic life, informs your career path, and/or affects your community.

Structure & Format

This course is an in-person seminar-style course. In class each week, we will discuss a peer-reviewed article. In addition to leading a paper discussion, students will practice skills that are important for a career in science. These skills include giving presentations, leading demonstrations, writing essays and review papers. The structure of this course is greatly affected by the ongoing pandemic and we will adhere to the recommendations of USM leadership. As of 1/11/22, the recommendation has been for the first 2 weeks of classes to be completely remote.

Assignments

1. **Discussion Leader**

   When you are a **discussion leader**, you will come to class prepared to lead a thoughtful discussion of the assigned paper. ****** Note, that undergraduate students will lead their discussion in pairs, while graduate students will their discussion individually.******

   This assignment involves the following components:

   Due 1 week before your discussion **by midnight:**

   o **Class questions -** Upload your class discussion questions to Brightspace in a format that can be edited (Microsoft Word preferred). Only one set of questions needs to be turned per discussion lead pair.
      1. Individual questions - You will create a list of questions that will be individually assigned to each student in the class. To answer these questions, students may need to do a bit of background research. These questions should be designed to add depth, breadth, and/or context to the paper being discussed.
      2. Class questions - You will also create 1-2 questions for the entire class. To answer these questions, students will need to reflect on a topic from the paper as it relates to their own life. Each student is expected to answer these questions.

   Due the night before your class discussion, you should upload your presentation to Brightspace **by midnight** *(one per discussion lead pair)*

   During class:

   o **Opening presentation** – Introduce the paper, set the stage for the discussion, and outline major points. This will be in the form of a slideshow presentation 10-15 minutes.
   o **Facilitate the discussion** – Work through topics within the paper, using your assigned questions as a guide. Finally, you will wrap up the discussion.

2. **Hands-on Demonstration**

   Each of you will individually lead a 5-10 minute interactive exercise at the beginning of class. Examples might include a quick game to illustrate principles of DNA replication or a how-to demonstration of a molecular technique. The target audience can be anyone from kindergartners to scientists – this helps you establish the difficulty-level of your demo. No matter what audience you choose, we (the class) will be your actual audience. The purpose of these demos are to practice your scientific communication skills and

deepen your understanding of basic principles in eDNA science.

3. **Whiteboard Mini-lecture**
   Each of you will give a 5-10 minute lecture on a broad concept related to course material. There is a list of potential topics on Brightspace. You are also welcomed to come up with your own topic, just email Dr. Lasley-Rasher ahead of time to discuss.

4. **Class participation**
   During class, you are graded on your verbal contributions and adherence to our class's code of conduct. At a minimum, you are expected to thoughtfully answer the question that you were assigned. In order to get full participation points, you should make at least one additional contribution to our discussion.

5. **Independent Project (based on a topic of your choice related to eDNA science)**
   o **This project is broken into the following 3 components**
     1. Essay (2 pages, double-spaced) on how your topic relates to one of the following:
        a. An aspect of your non-academic life (i.e. a hobby, job, passion, past experience etc.)
        b. An aspect of your future career path
     2. Presentation (10 - 12 minutes) slide show presentation summarizing one peer-reviewed journal article related to your topic.
     3. Final paper (8-10 pages for graduate students).
        a. Title - A short, concise, expressive title
        b. Introduction – Describe the necessary background information to put your paper in context. Start with broad statements. Why is this topic important/interesting? Clearly introduce your topic and provide necessary background information.
        c. Body of the paper – Include descriptive headings. Your goal is to describe and synthesize information from various peer-reviewed resources. Note, that is not enough to simply summarize major findings from papers. You must *connect* these findings to *your specific topic.* It should be incredibly apparent to the reader why you selected a particular paper. Please put page numbers on the bottom right corner of each page
        d. Conclusion – This should only be a few sentences. This where you may briefly summarize the most important take-home messages of your paper.
        e. References should be formatted in APA (American Psychological Association) format. Graduate students need a minimum of 10 peer-reviewed articles.

Grading Criteria

Assignment / Assessment	Value
Discussion leader	30%
Hands-on exercise	5%
White board mini-lecture	5%
Class participation	10%

Independent project	50%

Course Evaluations

At the end of each semester, every student has the opportunity to provide constructive feedback on their courses. It is important to me that you take the time to let me know your thoughts about the course. I use your feedback to make improvements to the course materials, assignments, and outcomes.

Course Policies

Grading Scale

100-93%	=	**A**	79-77%=	**C+**	
92-90%=	**A-**		76-73%=	**C**	
89-87%=	**B+**		72-70%=	**C-**	
86-83%=	**B**		69-60%=	**D**	
82-80%=	**B-**		60% or lower	=	**F**

Attendance and Late Work – <u>READ CAREFULLY!</u>

Discussion and collaboration is the nature of this class! Full participation points are only awarded for full participation – meaning, you are fully engaged in the class discussion and adhere to the class's code of conduct for respectful communication.

- *Missing class* on a day when you are presenting or leading a discussion results in a zero for that assignment.
- *Missing a class* on any other day results in a **3% reduction in your overall grade, unless you have prior permission from the instructor.** Under very rare circumstances, you may avoid this penalty by:
    1. Sending your discussion answers to the discussion leader **before class** and
    2. Completing a makeup assignment that is due **one week** after your missed class. *It is your responsibility to reach out to Dr. Lasley-Rasher about completing this assignment.*
- *Late assignments* are penalized 10% per day to a maximum of a 40% deduction.
- *Be ready to switch to a remote class as needed.* There is a chance that we will need to switch our class to an online format due to COVID-related risks or school closures. If this happens you will be notified well in advance, and we will meet via Zoom.

Withdrawal from the Course

Last day to drop 100% refund, 1/31/22
Last day to drop with a grade of "W" 4/1/22
For more information, review USM's Add/Drop and Withdrawal Policies[1].

Class Cancellation

Be sure that you have enrolled in the campus notifications services, so that you are aware of any closures due

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[1] https://usm.maine.edu/reg/addingdroppingwithdrawal

to inclement weather. From time-to-time USM will determine to close the University due to inclement weather. When the cancellation is for an entire day, the class content will be made up at another time or through additional, outside of class assignments.

Academic Integrity / Plagiarism

Everyone associated with the University of Southern Maine is expected to adhere to the principles of academic integrity central to the academic function of the university. Any breach of academic integrity represents a serious offense. Each student has a responsibility to know the standards of conduct and expectations of academic integrity that apply to academic tasks. Violations of student academic integrity include any actions that attempt to promote or enhance the academic standing of any student by dishonest means. Stealing the words or ideas of another (i.e., plagiarism), making statements known to be false or misleading, falsifying the results of one's research, improperly using library materials or computer files, or altering or forging academic records are examples of violations of this policy which are contrary to the academic purposes for which the University exists. Acts that violate academic integrity disrupt the educational process and are not acceptable.

Evidence of a violation of the academic integrity policy will normally result in disciplinary action. A copy of the complete policy may be obtained from the [Dean of Students Office website](#)[2] or by calling and requesting a copy at **(207) 780-5242**.

Course Schedule (Tentative)

Readings / Assignment Schedule **(subject to alteration with notice)**

Weeks are Monday – Sunday to allow you flexibility in completing your reading, engaging in discussion, and submitting assignments.

Week	Module	Topics Activities	Assignments Due
1		**1/21: Introduction, class conduct exercise**	* **Information sheet** *due Sunday, 1/23 by midnight*
2	**eDNA in Ecology & Environmental Science**	**1/28: eDNA in conservation science** • Paper discussion: Cristescu & Hebert 2018 – Uses of eDNA in conservation science • Supplemental paper - Huerlimann et al. 2020 – conservation review	
3	**eDNA in Ecology & Environmental Science**	**2/4: Species of concern: endangered species** • Hands-on demo & Whiteboard lecture • Paper discussion Biggs et al. 2015 – Crested newts	

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[2] https://usm.maine.edu/community-standards-mediation/academic-integrity

4	eDNA in Ecology & Environmental Science	2/11: Species of concern: invasive species • Hands-on demo & Whiteboard lecture • Paper discussion: Crane et al. 2021 – eDNA detection of European green crab – Crested newts	* Essay paper *due Sunday, 2/13 by midnight*
5	eDNA in Ecology & Environmental Science	2/18: Biodiversity monitoring • Hands-on demo & Whiteboard lecture • Paper discussion: Stat et al. 2017 – Ecosystem monitoring in a tropical system OR Diaz et al. 2020 SPM as source of eDNA for fish metabarcoding • Supplemental paper – Francis & Willerslev 2015 – Past and present biodiversity from eDNA	
6	eDNA in Ecology & Environmental Science	2/25: VIRTUAL CLASS GUEST LECTURE	* Final paper topic due *Sunday, 2/20 by midnight*
7	eDNA in Ecology & Environmental Science	3/4: Inferring trophic interactions • Hands-on demo & Whiteboard lecture • Paper discussion: TBD • Supplemental paper – Sousa et al. 2019 DNA metabarcoding in diet studies	
8	eDNA at the Nexus of Evolution and Human Health	3/11: Historical ecology • Hands-on demo & Whiteboard lecture • Paper discussion: Rampelli et al. 2021 – Components of Neanderthal gut microbiome • Supplemental paper - Winther et al. 2015 – Ancient and modern eDNA	* Annotated bibliography due *Sunday 3/13 by midnight*
9		3/18: SPRING BREAK – NO CLASS	
10		3/25: Presentations	* Presentation files should be uploaded to Brightspace the night before class, *by midnight*
11	eDNA Human Health Science	4/1: Detecting pathogens • Hands-on demo & Whiteboard lecture • Paper discussion: Cilia et al. 2021 – Honey bee colonies for detecting SARS-CoV-2 • Supplemental paper - Farrell et al. 2021 Promises and pitalls of eDNA for monitoring human and	

12	eDNA Human Health Science	**4/8: Infant microbiome** • Hands-on demo & Whiteboard lecture • Paper discussion: Tapianen et al. 2018 – Maternal influence on the fetal microbiome based on meconium OR Combellick et al. 2018 – Microbiota of neonates born at home or in hospital	
13		**4/15: Presentations**	*** Presentation files should be uploaded to Brightspace the night before class, *by midnight***
14		**4/22: NO CLASS – Individual meetings to discuss paper**	
15		**4/29:** • Hands-on demo & Whiteboard lecture • Paper discussion: Class picks the paper!	*** Final paper due *Sunday, 5/1 by midnight***
16		**5/6: FINALS WEEK – There is no final exam for this course**	

Technology

Technology Support Center (Help Desk)
If you need technical support at any time during the course (especially concerning Brightspace), please contact the Technology Support Center:

Phone: (207) 780-4029   or **1-800-696-4357**

Email: help@maine.edu

- You need a maine.edu account to access most of our online resources. If you can't remember your account information, visit the UMS User Account Management website[3] or contact IT at **1-800-696-4357** and ask them to help you access your maine.edu account.

- The USM Portal[4] can be used to reach your student email, Brightspace, MaineStreet and most other university online tools through a single website.

- If this is the first time you've used Brightspace, Check out USM's Student Brightspace Training[5]

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[3] http://accounts.maine.edu/
[4] https://my.usm.maine.edu/
[5] https://courses.maine.edu/d2l/le/discovery/view/course/86822

Computer Access

Participants will need a reliable PC or a Mac with the latest version of a web browser. In addition, you will need a broadband Internet connection (DSL or faster). Below is a suggested list of recommended software you may need to access electronic resources for this course.

Latest Versions of Web Browsers

· [Mozilla Firefox](http://mozilla.com/firefox)[6] (Windows / MacOS) - Recommend

· [Google Chrome](http://www.google.com/chrome/)[7] (Windows/MacOS) - Recommended

· [Safari](http://www.apple.com/safari/)[8] (MacOS - Update through the App Store)

Note that Brightspace and many other web-based applications used in USM courses do not work well in Microsoft's web browser, Edge.

Brightspace Technical Requirements

D2L recommends having the latest version of whatever browser is being used on any computer or mobile device. Brightspace works very well on mobile Apple and Android devices via web browser. The Brightspace Pulse app in the Apple App Store and Google Play also allows you to receive notifications regarding your courses on your device.

The Pulse app is primarily meant for students to receive course announcements, and updates via push notifications on their mobile devices. The Pulse app is not "Brightspace for mobile devices." The Brightspace site (courses.maine.edu) itself is mobile friendly. The full content for a course can be accessed by tapping the menu button in the upper-right corner of the Pulse app screen, and selecting "Launch Course Homepage." This will take you directly to the full course on Brightspace in your device's web browser.

Technology in the Classroom

If you have a situation that requires you attend to a silenced phone during class, please let me know ahead of time. It is important that you are fully engaged in discussions and presentations during class. As a courtesy to others, I will not allow laptops or other electronic devices to be out during discussions or presentations, as these can be distracting. Violations will result in points being deducted for class participation.

Netiquette

Our text-based communication is vital in this course since it is the primary - and possibly only - way we will connect with each other. Please be careful and considerate in all your communications with each other and your instructor.

The online medium is poor at conveying tone. Consider what you are saying and remember that your intent might not be inferred by your readers (fellow students and instructors). Take a moment to re-read everything you write: assume that it will be taken in the worst possible light. And extend courtesy to others: assume the

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[6] http://mozilla.com/firefox
[7] http://www.google.com/chrome/
[8] http://www.apple.com/safari/

most charitable light possible. Both of these steps will make communication easier and far more civil.

Student Data Retention

Your maine.edu account is issued to you for as long as you are a student of this or any other University of Maine System campus. There are various limits on how long IT can retain data you have stored through this account depending on which services you have used. Below are the major points, but we encourage you to [visit the UMS User Account Management website](#)[9] for full details on maine.edu account policies.

Assignments and other work stored in Brightspace

Do NOT treat important academic work in old Brightspace courses as your sole copy. Each semester, all courses receive a fresh Brightspace page commonly referred to as a "shell." Course shells older than two years are automatically purged from the system, but sometimes instructors remove old course shells manually on their own. It is strongly recommended that you make backups of any work you have submitted to Brightspace before or shortly after your course ends. **Especially if your program requires you to maintain a portfolio of work you have done.**

Google Products

Your maine.edu account is also a fully functional Google Account with access to Gmail, Google Drive, and most of Google's other products. After leaving the university, either through graduation or simply not registering for courses, credit-earning students have 5 years before their maine.edu account is removed. The limit is 2 years for non-credit students. This includes files and email stored in Google's products using your maine.edu account. If this data is important to you, or if you need to retain it for a portfolio or future certification, you must **make and maintain your own personal backups of these files.** [Consider using Google Takeout](#)[10] to backup this data prior to separating from the University.

Box & Others

If you are using Box through your maine.edu account, please be aware that your storage can only be maintained for one year after you have graduated, or otherwise separated from the university.

University Policies & Support Resources

ADA & Electronic Accessibility Notification & Accommodations

The university is committed to providing students with documented disabilities equal access to all university programs and services. If you think you have a disability and would like to request accommodations, you must register with the Disability Services Center. Timely notification is essential. The Disability Services Center can be reached by calling **(207) 780-4706** or by email at **dsc-usm@maine.edu**. If you have already received a faculty accommodation letter from the Disability Services Center, please provide me with that information as soon as possible. Please make a private appointment so that we can review your accommodations.

The following is a list of accessibility resources for the software we use in this course:

- [Brightspace Accessibility information](#)[11]

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[9] http://accounts.maine.edu/

[10] https://takeout.google.com

[11] https://www.d2l.com/accessibility/standards

- [Google Suite Accessibility information](#)[12]

Tutoring & Writing Assistance

Tutoring at USM is for all students, not just those who are struggling. Tutoring provides active feedback and practice, and is available for writing, math, and many more subjects. Walk-in tutoring is available at the Glickman Library in Portland, the Gorham Library, and the LAC Writing Center.

- For best service, we recommend [making an appointment at the Learning Commons scheduling website.](#)[13]
- Questions about tutoring should be directed to **Naamah Jarnot** at **(207) 780-4554**.
- Interested in becoming a more effective, efficient learner? [Check out the AGILE website!](#)[14]

Counseling

Counseling is available for USM students. The best way to schedule an appointment is by phone at **(207) 780-5411**.. More information is available on the [University Health and Counseling Services website](#)[15].

Recovery Oriented Campus Center (ROCC)

A peer support community for students in recovery from substance abuse and other mental health conditions is available at USM. More information may be found online at the [Recovery Oriented Campus Center website](#)[16] or by containing ROCC at **(207) 228-8141**.

Non-Discrimination Policy & Bias Reporting

The University of Southern Maine is an EEO/AA employer, and does not discriminate on the grounds of race, color, religion, sex, sexual orientation, transgender status, gender expression, national origin, citizenship status, age, disability, genetic information or veteran's status in employment, education, and all other programs and activities. The following person has been designated to handle inquiries regarding non-discrimination policies:

Amie Parker, Interim Director of Equal Opportunity
The Farmhouse, University of Maine Augusta
Augusta, ME 04333,
(207) 581-1226, TTY 711 (Maine Relay System).

Incidents of discrimination or bias at USM should be reported to the **Bias Prevention & Response Team** (BRT) at **usmbiasresponse@maine.edu**.

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[12] https://support.google.com/a/answer/1631886?hl=en

[13] https://usm.maine.edu/learningcommons/schedule-tutoring-appointment

[14] https://usm.maine.edu/agile

[15] https://usm.maine.edu/uhcs

[16] https://usm.maine.edu/recovery

Statement of Religious Observance for Students

Absence for Religious Holy Days

The University of Southern Maine respects the religious beliefs of all members of the community, affirms their rights to observe significant religious holy days, and will make reasonable accommodations, upon request, for such observances. If a student's religious observance is in conflict with the academic experience, they should inform their instructor(s) of the class or other school functions that will be affected. It is the student's responsibility to make the necessary arrangements mutually agreed upon with the instructor(s).

Title IX Statement

The University of Southern Maine is committed to making our campuses safer places for students. Because of this commitment, and our federal obligations, faculty and other employees are considered mandated reporters when it comes to experiences of interpersonal violence (sexual assault, sexual harassment, dating or domestic violence, and stalking). Disclosures of interpersonal violence must be passed along to the University's Deputy Title IX Coordinator who can help provide support and academic remedies for students who have been impacted. More information can be found at the Campus Safety website[17] or by contacting Sarah E. Holmes at **usm.titleix@maine.edu** or **(207) 780-5767**.

If students want to speak with someone confidentially, the following resources are available on and off campus:
- **University Counseling Services:** (207) 780-4050
- **24 Hour Sexual Assault Hotline:** 1-800-871-7741
- **24 Hour Domestic Violence Hotline:** 1-866-834-4357

Policy On Acceptable Conduct In Class Settings

If a student substantially disrupts a class, the professor may ask the student to align with this policy on conduct in a class setting. If the student refuses, the professor may, at their discretion, ask the student to leave. If the professor takes this step, they must attempt to communicate with the student and provide informal counsel and advice. The professor may elect to notify their dean of the situation as well. If the student disrupts the class again, the professor may, at their discretion, provide a written notification to the student, describe the offending behavior, and refer the student's case to the appropriate academic dean and notify the dean of students that an official student conduct code violation has occurred. The Student Conduct Process is detailed on the Community Standards and Mediation website[18].

Covid Face Covering Requirement

Per USM and the University of Maine System, all students, faculty, and staff members are required to wear a face covering, including during all face-to-face classes. Resident students are exempted from this requirement when in their own room in the residence hall. Students seeking additional exceptions from this requirement should refer to the **Disability Accommodations** section of this syllabus. Full information on Covid restrictions

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[17] https://usm.maine.edu/campus-safety-project
[18] https://usm.maine.edu/community-standards-mediation/conduct-process

and guidelines can be found on the University of Maine System website[19].

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[19] https://www.maine.edu/together/community-guidance/everyone/