BI 610 | Advanced Evolutionary Genetics VI: Phylogenetics
Spring 2022

Time and Location: Monday Wednesday, 10:00am – 11:20am, Friday 10:00am-10:50am
*Note: course runs May 11th – June 3rd.

Professor: Matthew Barber, Ph.D.
● Email: mfbarber@uoregon.edu
● Office hours are available by appointment

Course Description. Phylogenetics encompasses the study of evolutionary relationships between and among groups of organisms. In this course we will explore fundamental principles and approaches used to make phylogenetic inferences, focusing on the use of molecular data. The 1-credit course will involve a combination of interactive lecture as well the use of phylogenetic software to analyze molecular sequence data. This course is intended for graduate students with a background in evolutionary biology and/or ecology and constitutes the sixth section in the Advanced Evolutionary Genetics training modules.

Learning Goals. Upon completing this course, students will be able to:
1. Explain fundamental principles regarding the structure, inference, and interpretation of phylogenies.
2. Evaluate and distinguish between commonly-used approaches for phylogenetic inference.
3. Apply contemporary software to reconstruct and interpret phylogenies using molecular data.
4. Implement phylogenetic approaches to address broader questions in evolutionary biology and ecology.

Course Structure. This course will meet in person in the Science Library (B040). Links to download software and optional readings will also be posted on Canvas.

Email. Please include “BI610” in the subject line, so your email can be attended to in time. I will try to answer your email in a timely manner; however I do not often check our email in the evenings or during weekends.

Required supplies. A functioning computer with internet access will be necessary to follow along with in-class assignments. If you experience technical difficulties with internet connection or computer failure, please let the instructor know as soon as possible. Lecture notes will be uploaded to Canvas.

Evaluation: This course is Pass/Fail. The emphasis will be placed on learning approaches and applying them both in class and through assignments. Additional readings will be provided to supplement lectures and in-class assignments. Students who attend class and make concerted attempts to complete assignments are expected to pass this course.
Schedule

<table>
<thead>
<tr>
<th>Class session</th>
<th>Topic</th>
<th>Notes and assignments</th>
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<tbody>
<tr>
<td>5/11</td>
<td>Introduction, course overview, historical perspective on phylogenetics</td>
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<tr>
<td>5/13</td>
<td>Phylogenetic data, alignments, parsimony</td>
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<td>5/16</td>
<td>Inference methods intro: distance methods, maximum likelihood</td>
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<td>5/18</td>
<td>Bayesian phylogenetics, assessing tree reliability</td>
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<tr>
<td>5/20</td>
<td>Divergence time estimates, ancestral state reconstruction</td>
<td>Assignment 1 provided</td>
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<td>5/23</td>
<td>Phylogenetics and adaptation</td>
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<td>5/25</td>
<td>Evolution of gene families</td>
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<td>5/27</td>
<td>Reticulate trees, prokaryotic phylogenetics</td>
<td>Assignment 1 due; Assignment 2 provided</td>
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<td>5/30</td>
<td><strong>Memorial day: no class</strong></td>
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<td>6/1</td>
<td>TBD (student input)</td>
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<tr>
<td>6/4</td>
<td>Course summary, overview of additional learning resources</td>
<td>Assignment 2 due</td>
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**Class etiquette:** Please arrive on time. Lectures and discussions begin promptly on the hour.

**Inclusive Learning:** In this class we aim to build an inclusive learning environment. We understand that our members represent a rich variety of backgrounds and perspectives. We are committed to providing an atmosphere for learning that respects diversity. While working together to build this community we ask all members to:

- be open to the views of others.
- honor the uniqueness of their colleagues.
- appreciate the opportunity that we have to learn from each other.
- value each other’s opinions and communicate in a respectful manner.
- keep confidential discussions that the community has of a personal (or professional) nature.

Classroom courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender, gender variance, and nationalities. Class rosters are provided to the instructor with the students’ legal names. We will gladly honor your request to address you by an alternate name or gender pronoun. Please advise us of this preference early in the quarter (or before) so that we may address you properly.

**Students with disabilities:** If there are aspects of the instruction or design of this course that result in barriers to your participation, please let us know as early as possible, in person or via email. You may
also wish to contact Accessible Education Services in 164 Oregon Hall, by phone at (541) 346-1155 or uoaec@uoregon.edu. We welcome the chance to help you learn, and will work with you to make it a positive experience.

**Discrimination and Harassment**

*Prohibited Discrimination and Harassment Reporting*

Any student who has experienced sexual assault, relationship violence, sex or gender-based bullying, stalking, and/or sexual harassment may seek resources and help at [safe.uoregon.edu](http://safe.uoregon.edu). To get help by phone, a student can also call either the UO’s 24-hour hotline at 541-346-7244 [SAFE], or the non-confidential Title IX Coordinator at 541-346-8136. From the SAFE website, students may also connect to Callisto, a confidential, third-party reporting site that is not a part of the university.

Students experiencing any other form of prohibited discrimination or harassment can find information at [respect.uoregon.edu](http://respect.uoregon.edu) or [aaeo.uoregon.edu](http://aaeo.uoregon.edu) or contact the non-confidential AAEO office at 541-346-3123 or the Dean of Students Office at 541-346-3216 for help. As UO policy has different reporting requirements based on the nature of the reported harassment or discrimination, additional information about reporting requirements for discrimination or harassment unrelated to sexual assault, relationship violence, sex or gender based bullying, stalking, and/or sexual harassment is available at [Discrimination & Harassment](http://discrimination.uoregon.edu). Specific details about confidentiality of information and reporting obligations of employees can be found at [titleix.uoregon.edu](http://titleix.uoregon.edu).

**Reporting**

The instructor of this class is a Student Directed Employee. As such, if you disclose to me, I will respond to you with respect and kindness. I will listen to you, and will be sensitive to your needs and desires. I will not judge you. I will support you. As part of that support, I will direct students who disclose sexual harassment or sexual violence to resources that can help. I will only report the information shared to the university administration when you as the student requests that the information be reported (unless someone is in imminent risk of serious harm or is a minor). Please note the difference between ‘privacy’ and ‘confidentiality.’ As a Student Directed Employees I can offer privacy because I are not required to report certain information to the university. However, I cannot be bound by confidentiality in the same way that a counselor or attorney is. Confidential resources such as these means that information shared is protected by federal and state laws. Any information that we as student-directed employees receive may still be accessed by university or court proceedings. This means, for example, that I could still be called as a witness or required to turn over any related documents or notes that I keep. Please note also that we are required to report all other forms of prohibited discrimination or harassment to the university administration.

**Mandatory Reporting of Child Abuse**

UO employees, including faculty, staff, and GEs, are mandatory reporters of child abuse. This statement is to advise you that your disclosure of information about child abuse to the instructor may trigger my duty to report that information to the designated authorities. Please refer to the following links for detailed information about mandatory reporting: [Mandatory Reporting of Child Abuse and Neglect](http://mandatory-reporting.uoregon.edu).