**EESC04 – Biodiversity and Biogeography**  
**Winter 2023**

**Instructor:** Dr. Adam Martin (adam.martin@utoronto.ca).

**Teaching assistants:**  
Mahendra Doraisami (mahendra.doraisami@mail.utoronto.ca)  
Jennifer Powell (jennifer.powell@mail.utoronto.ca)

**Lectures:** Tuesdays 5-7pm, IC 208, with Web Option videos and PDF of slides posted on the course Quercus page after lectures.

**Office hours:** Tuesdays 10:00-11:00 am, Room EV 464.

**Practicals:** Thursdays, 9-11 am OR 11 am-1 pm OR 1-3 pm, Room EV 222

**Course readings:** Peer-reviewed papers listed below.

**Course description:**  
Biogeography is the study of the geographic distribution of species, and biodiversity is the study of species richness and relative species abundance. Through lectures and in-class discussions, this course explores the origin, maintenance, and loss of biodiversity, from a biogeographic perspective. The course aims to provide students with a broader understanding of what constitutes biodiversity, how it has come to be, and what geographic factors help explain and drive the patterns observed today.

The first half of the course will examine key themes within the sphere of biodiversity, including:

- **i)** Species concepts.
- **ii)** The number of species on Earth.
- **iii)** How biodiversity is distributed globally.
- **iv)** The value of biodiversity to humans.

The second half of the course then switches gears and evaluates key themes in the realm of biogeography including:

- **i)** Biodiversity changes across geologic time scales.
- **ii)** The major biomes of the world.
- **iii)** The Island Theory of Biogeography.
- **iv)** The SLOSS debate.
- **v)** The Anthropocene Epoch and the geological scale of human-caused extinctions.
Course Evaluation:

<table>
<thead>
<tr>
<th>Course Item</th>
<th>Due Date</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lab Report 1.</strong> Introduction to R statistical software for environmental science (* Independent).</td>
<td>Feb. 2nd</td>
<td>10%</td>
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<tr>
<td><strong>Lab Report 2.</strong> Analyses of biodiversity using R (* Independent)</td>
<td>Feb. 16th</td>
<td>20%</td>
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<tr>
<td><strong>Lab Report 3.</strong> Independent biodiversity research using R (* Groups of 3 students).</td>
<td>March 23rd</td>
<td>30%</td>
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<tr>
<td><strong>Lab 3 Research presentation.</strong> (* Groups of 3 students).</td>
<td>March 30th</td>
<td>15%</td>
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<tr>
<td>Final Exam (take home)</td>
<td>TBD</td>
<td>25%</td>
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In-class content and schedule:

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Lecture topic</th>
<th>Related paper review</th>
<th>During this week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jan. 10</td>
<td>Introduction to Biodiversity and Biogeography</td>
<td></td>
<td></td>
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<tr>
<td>2</td>
<td>Jan. 17</td>
<td>Species concepts and classification</td>
<td>Reading 1</td>
<td></td>
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<tr>
<td>3</td>
<td>Jan. 24</td>
<td>How many species are there in the world?</td>
<td>Readings 2.1, 2.2, and 2.3</td>
<td>Lab 1 report due (10%) * Independent assignment</td>
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<tr>
<td>4</td>
<td>Jan. 31</td>
<td>The latitudinal diversity gradient</td>
<td>Reading 3</td>
<td>Lab 2 report due (20%) * Independent assignment</td>
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<td>5</td>
<td>Feb. 7</td>
<td>Biodiversity and ecosystem function</td>
<td>Reading 4</td>
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<tr>
<td>6</td>
<td>Feb. 14</td>
<td>Biodiversity through geologic time Pt. 1</td>
<td>Reading 5</td>
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<td></td>
<td>Feb. 21</td>
<td><strong>Reading week</strong></td>
<td></td>
<td></td>
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<tr>
<td>7</td>
<td>Feb. 28</td>
<td>Biodiversity through geologic time Pt. 2</td>
<td>Reading 6</td>
<td></td>
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<tr>
<td>8</td>
<td>March 7</td>
<td>Biodiversity through geologic time Pt. 3</td>
<td></td>
<td></td>
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<tr>
<td>9</td>
<td>March 14</td>
<td>Biomes of the world</td>
<td>Readings 7.1 and 7.2</td>
<td></td>
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<tr>
<td>10</td>
<td>March 21</td>
<td>Island biogeography</td>
<td>Reading 8</td>
<td>Lab 3 report due (30%) * Small group assignment</td>
</tr>
<tr>
<td>11</td>
<td>March 28</td>
<td>The SLOSS debate</td>
<td>Reading 9.1 and 9.2</td>
<td>Lab 3 presentation (10%) * Small group assignment</td>
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<tr>
<td>12</td>
<td>Apr. 4</td>
<td>The Anthropocene and species extinctions</td>
<td>Reading 10.1 and 10.2</td>
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Course readings


**Assignments and graded material in brief**

**Lab Reports (**3** Witten Reports and 1 Presentation):** The lab-based and technical skills that EESC04 will largely focus on this term, are scientific literacy, and analysis of biodiversity data using R statistical software. This program is quickly becoming the leading program with which scientific data is analyzed, and therefore represents a highly transferable skill. In EESC04 this term, students will be led through a series of exercises that introduce students to this program, use R for fundamental analyses of biodiversity, and explore an in-depth project related to biodiversity that includes R-based analyses. In sum, these three lab reports and associated lab presentation are as follows:

**Lab 1 Report.** Introduction to R statistical software for environmental science. * Independent assignment.

**Lab 2 Report.** Analyses of biodiversity data using R. * Independent assignment.

**Lab 3 Report.** Independent biodiversity research using R. * Groups of 3 students.

**Lab 3 Presentation.** Independent biodiversity research using R. * Groups of 3 students.

**Final exam:** A comprehensive final exam covering the course material, though weighted heavily to the final half of the course, will be given during UTSC examination period worth 40% of your final grade. The final exam will consist of long answer questions, and will be based on both lecture and readings. The final exam will be distributed approximately 24 hours prior to the due date.
Course policies – written assignments

Late assignments: All late assignments will be graded at a penalty of 10% per day.

Plagiarism: Plagiarism is a serious academic offence. Please read the faculty’s guidelines on plagiarism. Do not hesitate to consult with your instructor or TA about strategies that you can use to avoid being accused of plagiarism. Please note that all of your assignments will be reviewed through Ouriginal, which will compare your content to both published material, and material submitted by others in EESC04.

Course website – Quercus: EESC04 uses Quercus as its course website. To access the EESC04 website go to the U of T portal login page at http://toolboxrenewal.utoronto.ca/, and log in using your UTORid and password. Once you have logged in to the portal, look for your course modules where you’ll find the link to the EESC04 course website.

Email contact, office hours, and communication: The course instructor will send out important course information on Quercus. Therefore all students are required to have a valid UTSC email address. You are also responsible for ensuring that your UTSC email address is set up and properly entered in the ROSI system. You may also email me questions about course material. I will make an effort to respond to you within 24 hours during weekdays. My responses will take longer during weekends because I deliberately remain offline. Email should not be a substitute to in-person course time.

Accessibility Statement: Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodation, please feel free to approach me and/or Accessibility Services Office as soon as possible. I will work with you and Accessibility Services to ensure you can achieve your learning goals in this course. Enquiries are confidential. The UTSC Accessibility Services staff (located in S302) is available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations (416-287-7560 or ability@utsc.utoronto.ca).

The Writing Centre: The Writing Centre is a free service that provides support for teaching and learning through writing for all UTSC students. The Writing Centre provides service such as one-on-one consultation, drop-in hours, English language development and writing clinics. They are located in AC 210, in the Academic Resource Centre.

Health and Wellness Clinic: The Health & Wellness Centre has trained health professionals to provide medical, nursing, counseling, health promotion, and education services to University of Toronto Scarborough students. Any student with a current student card and a valid health card can use our services. They are located in the Student Centre, UTSC, SL 270.