ENV441H1: HUMAN HEALTH IMPACTS OF NATURAL SYSTEM ALTERATION – Winter 2025

I COURSE LOGISTICS

TIME: ***Lecture***: Mondays 2-4pm; ***Tutorial***: Mondays 4-5pm (**four** tutorials are scheduled through the term; see course schedule)

First lecture: Monday, January 6th, 2025
Last lecture: Monday, March 31st, 2025

INSTRUCTOR
Ranaivo A. Rasolofoson, Assistant Professor, School of the Environment
Email: ranaivo.rasolofoson@utoronto.ca
Office hours: Mondays 12-1:30pm (by appointment only)

The course uses **Quercus** for the provision of course materials, instructions and submission of assignments and communications between instructor and students. Quercus can be accessed at http://portal.utoronto.ca using UTORid and password.

II COURSE OVERVIEW

COURSE DESCRIPTION:
Unprecedented advances in science, technology, and economic development have improved the health and wellbeing of billions of people across the globe over the past century. However, these advances have led to rapid population and consumption growth that have resulted in rapid and extensive changes of the world's natural systems (e.g., climate, forests, ocean). Because environmental changes affect many aspects of our lives, e.g., the food we eat, the water we drink, the air we breathe, and our exposure to diseases, there is a growing concern that these changes are increasingly contributing to the global burden of disease and will become a major contributor in the future. This course introduces students to the drivers and manifestations of global environmental changes and how these changes affect human health. Through readings, case studies, and discussions students will explore interdisciplinary approaches to analyze the complex relationships between natural systems and human health, explain inequitable health impacts of environmental changes, and identify solutions that sustain and improve human health while mitigating environmental degradation.

STUDENT LEARNING OUTCOMES:
By the end of this course, students will be able to:

1- Describe the drivers and manifestations of global environmental changes: climate change, biogeochemical cycles, land use and land cover change, water scarcity, biodiversity loss, pollution, ocean and coastal transformation

2- Explain why certain subpopulations are disproportionately affected by environmental changes (**inequity**)
3- Analyze the complex relationships between environmental changes and human health using **interdisciplinary approach** and **systems thinking**
4- Identify and evaluate solutions that both mitigate environmental degradation and improve human health

PREREQUISITE COURSE(S):
This course requires the completion of:

- ENV341H1 or ENV337H1
- Or **with permission of the instructor,** completion of at least 12.0 credits that include courses in:
  - Environmental Science or Studies (e.g., ENV200H1, ENV221H1, ENV222H1),
  - Biology or Ecology (e.g., EEB240H1, BIO220H1

Note: Medical or public health related courses are useful but not required.

READINGS:
Reading materials include textbook chapters, case studies, and peer-reviewed journal articles. Hardcopies of the textbooks are not required. All texts are available online open access or through UofT Library. A weekly reading list with online access links to the reading materials is available in **Weekly Materials** in Quercus.

Textbooks:

- Myers & Frumkin 2020, Planetary Health. Protecting Nature to Protect Ourselves. Island Press, Washington DC, USA.
- Haines & Frumkin 2021, Planetary Health. Safeguarding Human Health and the Environment in the Anthropocene. Cambridge University Press, New York, USA.

Case studies:

- Duff, H., Faerron Guzman, C., Almada, A., Golden, C., and Myers, S. 2020. Planetary Health Case Studies: An Anthology of Solutions. DOI: 10.5822/phanth9678.

Peer-reviewed journal articles are available in **Weekly Materials** in Quercus.

III COURSE ORGANIZATION

This course is organized by weeks. Week 1-4 cover the course logistics and foundational topics, including health impact inequity Week 5-9 look at the human health impacts of various natural system transformations. Week 9-12 go over adaptation and resilience, and solutions to address both environmental degradation and ill-health (see **course schedule table** below for weekly topics).

1. *Assigned readings*: **All readings are required unless indicated otherwise (i.e., recommended). Students are expected to read at least the required weekly texts before coming to class each week**. Assigned readings are essential for students to be able to follow and contribute to class discussion and presentation.
2. *Classes*: Weekly classes are **mainly in the form of reading or case study discussion**. There are short lectures for **only a few of the weekly classes**.
3. *Group presentations*: Each week, for the classes that cover health impacts of natural system transformations (week 5, 6, 8, 9), students present group works based on assigned background readings. Additional details are given in the **group presentation** section below.

COURSE SCHEDULE, TUTORIAL & ASSIGNMENT SUBMISSION DEADLINES:

WEEK	WEEK END DATE	TOPIC	TUTORIAL	DEADLINE
1	Jan.6	Course introduction		
2	Jan.13	Environmental change drivers; One Health vs. Planetary Health	1- Topic identification; literature search	
3	Jan.20	Natural system transformations; Health outcomes; Social-Ecological Systems	2- Annotated bibliography	**Topic identification due on Jan.20 at 11:59 pm**
4	Jan.27	Health impact inequity		
5	Feb.3	Climate change and human health		
6	Feb.10	Pollution, land use change, biodiversity loss and human health	3- System diagram	**Annotated bibliography due on Feb.10 at 11:59 pm**
	Feb.17	Reading week		
7	Feb.24	Food systems and human health (guest speaker Sarah Jarvis, Department of Nutritional Sciences)		
8	Mar.3	Urbanization and human health	4- Analytical paper outline	**System diagram due on Mar.3 at 11:59 pm**
9	Mar.10	The oceans, coastal transformation and human health		

10	Mar.17	Adaptation and resilience		
11	Mar.24	Transforming energy		**Analytical paper outline due on Mar.24 at 11:59 pm**
12	Mar.31	Key challenges and solutions		
	Apr.11			**Final analytical paper due on Apr.11 at 11:59 pm**

TUTORIAL OBJECTIVES:
The tutorials are intended to provide guidance and point to resources students will need for their upcoming assignments. Students are required to carefully read the materials in **Assignments** in Quercus, including the assignment **Important Overview** and the instructions provided for each individual assignment. Students are also encouraged to discuss assignment-related concerns or questions during the tutorials. There are four tutorials (Jan.13, Jan.20, Feb.10, and Mar.3). Each tutorial covers a specific assignment (see the table for course schedule above). Tutorial materials are in **Tutorials** in Quercus. **Tutorial attendance is required**.

IV PROCESS OF EVALUATION

Achievement of the learning outcomes will be evaluated as follows:

PARTICIPATION IN READING AND CASE STUDY DISCUSSION: Students are required to engage in discussing the assigned readings and case studies in class. Below are some *specific* examples of high-quality participation we will be observing and noting (adapted from Andrew Jones, Univ of Michigan and Kathryn Fiorella, Cornell University):

- **Be in class on time** (attendance).
- Ask a question or **make a comment that shows you are interested** in what another person says, and/or encourages others to elaborate on something they have already said or done.
- **Make a comment that underscores the links between two or more students' contributions**. Contribute something that builds on, or springs from, what someone else has said or done.
- **Make comments that connect the background and case study readings**
- **Make comments that connect the assigned readings** to other resources (**e**.g., peer-reviewed articles, websites, videos, news) not covered in the syllabus or materials covered in previous classes/readings.

- **Make a summary observation** that takes into account several people's contributions, and which touches on a recurring theme in a discussion.
- Find a way to **express appreciation for the learning** you have gained from a discussion. Try to be specific about what helped you.
- **If you have a critical comment, make it diplomatically**, focusing on the issue at hand, and not on the people with whom you have a differing viewpoint.

GROUP PRESENTATION: The classes that cover health impacts of natural system transformations have students do group presentations each week (week 5, 6, 8, 9). Students are grouped by types of health outcomes (*infectious disease*, *non-communicable disease*, *nutritional health*, *mental health*). Using information from the weekly required **background reading**, each group identifies 1 or 2 specific health outcomes (e.g., malaria, diarrheal disease, hypertension, stunting) and presents 1 or 2 diagrams showing drivers (or causes) of a natural system transformation and how such transformation impacts the health outcomes (i.e., specifying intermediate outcomes). The number of health outcomes and diagrams presented (i.e., 1 or 2) depend on the complexity of the diagrams. **Group membership rotates weekly**. The group presentation lasts for **7-8 min + 2 min for questions**. An excellent presentation in this short time frame will require a good command of the information presented.

The groups use the weekly required background readings as the primary sources of information to prepare the presentations. References cited in the background readings can then be used to gather further information to build more complete diagrams. Students are also encouraged to search for other sources of information. Diagrams can be drawn on a whiteboard or presented on slides or in other formats. The following criteria are used to evaluate a presentation:

- **Timing** - how well the student adhered to the limitations set for the presentation
- **Success in communicating** key concepts succinctly and accurately, thereby demonstrating sound understanding of the work being presented.
- **Mechanics of communication** - speaker's demeanor (clarity of articulation, professionalism, confidence with material), structure of the presentation and level of organization.
- **Ability to respond** appropriately and fairly to questions and contribute to and stimulate unstructured discussion among peers.

ANALYTICAL PAPER: Students select **a specific area** (e.g., a city, a town, a region, a county, a lake, a park, a protected area, a coastal community), which will be the study site. In the specific area, students investigate **a specific natural system transformation** and its impacts on **a specific human health outcome**. Students also propose **a specific intervention** to address both the natural system transformation and its health impacts. The analytical paper provides students with an opportunity to practice **social-ecological systems analysis skills** in context of

the environment-health nexus. Students are expected to demonstrate their ability to use **systems thinking** to analyze health impacts of natural system transformations. They are also expected to integrate disciplines (social science, economics, natural science, public health, humanities…) in the analysis of their chosen social-ecological systems.

The analytical paper includes a **system diagram** accompanied by **text** totaling **3-4 pages** (font: 12 point Times New Roman, single spaced) and a **literature cited section** that list all references cited within the text. The literature cited section does not count toward the 3-4 pages. Additional tables, figures and creative formatting are encouraged but they count toward the 3-4-page limit. The **group presentations** provide students with opportunities to develop skills in developing system diagrams. **Case study readings** provide examples of content, organization, and interventions for the analytical paper, though case studies are longer and more extensive and can involve primary data collection and analysis (literature is the only source of information for the analytical paper).

Students develop the analytical paper in stages through **a set of assignments throughout the course** (Topic Identification, Annotated Bibliography, System Diagram, Analytical Paper Outline, Final Analytical Paper). Each assignment requires high-quality and thoughtful work at each stage to generate an excellent product. **Note these stages contribute to your final grade**. Further, if you have not completed one of the stages sufficiently, you will be asked to make an update to this assignment and given a due date for the updated work; failure to turn in the update will result in a 0 for that segment of the assignment. The assignments will be submitted through Quercus. Details about the analytical paper and associated assignments and instructions can be found in in **Assignments** in Quercus.

V GRADING SCHEME

Rubrics will be provided for major assignments.

MARK BREAKDOWN
Attendance (lecture + tutorial) = 12 % of total grade (1% each lecture OR 0.5% lecture + 0.5% tutorial when there is a tutorial)
Participation in reading and case study discussions = 25% of total grade (see specific examples of high-quality participation above)
Group presentation = 18 % of total grade (see criteria for a presentation evaluation above)
Preliminary analytical paper = 20% of total grade (topic identification: 4%, annotated bibliography: 8%, system diagram: 4%, paper outline: 4%]
Final analytical paper = 25% of total grade

V COURSE POLICIES

- Communication with instructor: the instructor will respond to email within 24 hrs on weekdays.

- Class discussion etiquette: The University of Toronto is committed to equity, human rights and respect for diversity. All members of the learning environment in this course should strive to create an atmosphere of mutual respect where all members of our community can express themselves, engage with each other, and respect one another's differences. U of T does not condone discrimination or harassment against any persons or communities.

- Copyright and privacy considerations:

  Course materials belong to the instructor, the University, and/or other source depending on the specific facts of each situation, and are protected by copyright. In this course, you are permitted to download course materials for your own academic use, but you should not copy, share, or use them for any other purpose without the explicit permission of the instructor.

  Students may create audio-recordings of the lectures and tutorials for their personal use. Recordings are intended to permit lecture and tutorial content review to enhance understanding of the topics presented. **Audio-recordings are not substitutes for attending class**.

  Students should note that since audio recordings are to be permitted, their voice may be recorded by others during the class. Please speak to the instructor if this is a concern for you.

  In accordance with the Accessibility for Ontarians with Disabilities Act, 2005, persons who have special needs will be accommodated.

  Students agree to the following terms when creating audio recordings of lectures:

  - Recordings are not to be distributed without the permission of the instructor via the Internet, using social media such as Facebook, peer-to-peer file sharing such as One Drive or Dropbox, or other distribution channels.
  - Recordings are not to be shared with other classmates unless they are to be used in collaborative assignments, or if the instructor permits for other reasons.

  Non-compliance with these terms violates an instructor's intellectual property rights and the Canadian Copyright Act. Students violating this agreement will be subject to disciplinary actions under the Code of Student Conduct.

- Deadlines for assignment submissions and late policy:

  It is extremely important that students submit each assignment on time. Each assignment builds upon the previous one. Late submission will therefore result in shorter time to complete the next assignment and may eventually result in pilling up, making it difficult to catch up.

  In case of an emergency that leads to late submission, contact the instructor as soon as possible (before the deadline) with **a proposed new submission date that must be before the next assignment due date**. The instructor will normally ask you for documentation in support of your specific circumstances. Recognized documentation includes:

  - Absence Declaration via ACORN (https://www.artsci.utoronto.ca/absence)
  - U of T Verification of Illness or Injury Form (VOI: https://www.registrar.utoronto.ca/policies-and-guidelines/verification-of-illness-or-injury/)
  - College Registrar's letter
  - Letter of Academic Accommodation from Accessibility Services

  Five percent points (5%) will be deducted for every day an assignment is late (for unjustified late submission that does not follow the aforementioned policy).

- Quercus: This course uses Quercus for the provision of course materials (including readings), instructions (including rubrics) and submission of assignments and communications between instructor and students. Students are expected to check the platform regularly.

- Process for requesting re-grading of assignments:

  A student who believes an individual item of work has been incorrectly or unfairly marked may ask the person who marked it for a re-evaluation. Such a request entails a re-marking of the entire work. Hence, if a re-marking is granted, the student must accept the resulting mark as the new mark, whether it goes up or down or remains the same. Submitting the re-marking request means the student accepts this condition. Students should make such requests as soon as reasonably possible after receiving the work back, but no later than 2 weeks after it was returned. Re-marking requests will only be considered for assignments worth more than 20% of the course grade.

  If the student is not satisfied with the instructor re-marking decision, they may appeal to the Undergraduate Associate Director of the School of the Environment, Michael Classens (ug.director.env@utoronto.ca).

- Process for signaling course absences:

  Attendance of lectures and tutorials are mandatory. Attendance and in-class participation contribute to students' final grades. If students miss a class because of an emergency, they are requested to contact the instructor as soon as possible, and no later than one week after returning to class. In case of an extended absence (beyond one week), students are expected to come forward as soon as possible. The instructor will normally ask you for documentation in support of your specific circumstances. Recognized documentation includes:
  - Absence Declaration via ACORN (https://www.artsci.utoronto.ca/absence)
  - U of T Verification of Illness or Injury Form (VOI: https://www.registrar.utoronto.ca/policies-and-guidelines/verification-of-illness-or-injury/)
  - College Registrar's letter
  - Letter of Academic Accommodation from Accessibility Services

VI TECHNOLOGY REQUIREMENTS

This course requires the use of computers. You are responsible for ensuring that you maintain regular backup copies of your files, use antivirus software (if using your own computer), and schedule enough time when completing an assignment to allow for delays due to technical difficulties. Computer viruses, crashed hard drives, lost or corrupted files, incompatible file formats, and similar mishaps are common issues when using technology, and **are not acceptable grounds for a deadline extension**.

VII INSTITUTIONAL POLICIES AND SUPPORT

ACADEMIC INTEGRITY

Academic integrity is essential to the pursuit of learning and scholarship in a university, and to ensuring that a degree from the University of Toronto is a strong signal of each student's individual academic achievement. As a result, the University treats cases of cheating and plagiarism very seriously. The University of Toronto's Code of Behaviour on Academic Matters (https://governingcouncil.utoronto.ca/secretariat/policies/code-behaviour-academic-matters-july-1-2019) outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences. Potential offences include, but are not limited to:

In papers and assignments:

1. Using someone else's ideas or words without appropriate acknowledgement.

2. Submitting your own work in more than one course without the permission of the instructor.
3. Making up sources or facts.
4. Obtaining or providing unauthorized assistance on any assignment.

On tests and exams:

1. Using or possessing unauthorized aids.
2. Looking at someone else's answers during an exam or test.
3. Misrepresenting your identity.

In academic work:

1. Falsifying institutional documents or grades.
2. Falsifying or altering any documentation required by the University.

All suspected cases of academic dishonesty will be investigated following procedures outlined in the Code of Behaviour on Academic Matters. If you have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, you are expected to seek out additional information on academic integrity from your instructor or from other institutional resources (see https://www.academicintegrity.utoronto.ca/).

ARTIFICIAL INTELLIGENCE

The use of generative artificial intelligence (AI) tools is strictly prohibited in all course assessments unless explicitly stated otherwise by the instructor. This includes, but is not limited to, ChatGPT, GitHub Microsoft Copilot, AI Tutor and Teacher's Assistant Pro, and open-source models that you have trained and/or deployed yourself. You may not interact with, nor copy, paraphrase, or adapt any content from any generative AI for the purpose of completing assignments in this course. Use of generative AI will be considered use of an unauthorized aid, which is a form of academic misconduct under the Code of Behaviour on Academic Matters.

This course policy is designed to promote your learning and intellectual development and to ensure that our evaluations are a fair and accurate assessment of your learning. Though it may be tempting to use generative AI to assist you when completing your assignments, this will simply inhibit your learning. If the work you submit is essentially the output of generative AI, then what have you learned and what value are you adding? Think of it this way: if a potential employer or supervisor can get as much from an AI tool as what you're able to do yourself, then why should they hire you at all? You should aim to understand course content at a level that far exceeds what an automated tool can achieve. Our course—and in particular, each assignment—is designed to help you attain true mastery of the course content. If you have questions or are stuck, please come to office hours, where the instructor will be happy to help!

USE OF TURNITIN (PLAGIARISM DETECTION TOOL)
Normally, students will be required to submit their course essays to the University's plagiarism detection tool for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the tool's reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of this tool are described on the Centre for Teaching Support & Innovation web site (https://uoft.me/pdt-faq).

ACCESSIBILITY NEEDS
Students with diverse learning styles and needs are welcome in this course. The University of Toronto is committed to accessibility: if you require accommodations for a disability, or have any other accessibility concerns about the course, please contact Accessibility Services as soon as possible.

ADDITIONAL SERVICES and SUPPORT
The following are some important links to help you with academic and/or technical service and support

- General student services and resources at Student Life
- Full library service through University of Toronto Libraries
- Resources on conducting online research through University Libraries Research
- Resources on academic support from the Academic Success Centre
- Learner support at the Writing Centre
- Information for Technical Support/Quercus Support