University of Toronto at Scarborough
Department of Physical and Environmental Sciences

EES A06: Introduction to Planet Earth

Winter 2022

Dr. Kirsten Kennedy

Teaching Assistants and their general roles:

Course Administration**: Siobhan Bonisteel** and **Christine Palermo**
Technical Support: **Shane Sookhan**
Course Material: **Syed Bukhari**

Contact Information:

Most questions can be directed to the discussion boards but pressing personal matters can be directed to the instructor or any TA as appropriate through the Quercus Inbox.

Please read this document carefully especially the part on online modules. By answering the quiz which is worth 3 bonus marks you are agreeing to having read and accepted the conditions on submitting modules.

Structure of the course

This course consists of weekly 2 hour lectures (available synchronously and asynchronously) with a mid-term and final exam (worth 27% and 33% respectively) and 10 approximately weekly online modules (10 x 4 = 40%).

Quercus

This course uses the University's learning management system, Quercus, to post information about the course. This includes posting readings and other materials required to complete class activities and course assignments, as well as sharing important announcements and updates. The site is dynamic and new information and resources will be posted regularly as we move through the term, so please make it a habit to log in to the site on a regular, even daily, basis. To access the course website, go to the U of T Quercus log-in page at https://q.utoronto.ca. Once you have logged in to Quercus using your UTORid and password, you should see the link or "card" for EESA06H3 S 20221:Introduction to Planet Earth. You may need to scroll through other cards to find this. Click on the EESA06H3 S 20221:Introduction to Planet Earth link to open our course area, view the latest announcements and access your course resources. There are Quercus help guides for students that you can access by clicking on the "?" icon in the left side column. SPECIAL NOTE ABOUT GRADES POSTED ONLINE: Please also note that any grades posted are for your information only, so you can view and track your progress through the course. No grades are considered official, including any posted in Quercus at any point in the term, until they have been formally approved and posted on ACORN at the end of the course. Please contact me as soon as possible if you think there is an error in any grade posted on Quercus.

Introduction

In this course, you will learn how our planet 'works' by virtual visits to countries in very different geologic settings and by examining the often destructive nature of geologic processes like earthquakes, tsunamis, glaciers, and volcanic eruptions.

We will examine how the landmasses that occupy the surface of the planet are being continually moved and reshaped by the immense forces of 'Plate Tectonics' over its long 4.5-billion-year history. At one time, geologists thought that continents and oceans were immovable, fixed in position and had formed where they are now found. Better knowledge of the Earth's interior and realization that the mantle is hot and is slowly moving by convection which when combined with improved knowledge of the ocean floors resulted in the development of Plate Tectonic theory in 1968 by the University of Toronto geologist, Jock Tuzo Wilson. The hard rocky outer skin of the planet (the crust) is thick (up to 100 km or more), brittle and broken into large pieces called '*lithospheric plates.*' Continents are carried like passengers in the plates that move over the weak hot mantle rocks below at rates up to 25 cm a year. By sliding around the surface of the planet, plates move continents around, opening and closing ocean basins as continent collide or break apart and it has been in operation for at least 3.5 Ga. This process is ongoing: Toronto is moving 3.7 cm every year. *In the 50 years that UTSC has been in existing it has moved almost 2 m westward from its original position.* Your home is not where it was last night and will be in a different place tomorrow. Don't get lost.

The entire plate tectonic process can be likened to a conveyor belt where new crust is created at spreading centres and eventually destroyed by subduction. In this way, the Earth is neither expanding nor shrinking in size. In some cases, orogenic events result in the fusing together of plates (a process called 'obduction') and the creation of even larger plates (called *supercontinents*). Geologists recognize a cycle of supercontinent formation and breakup (*the Wilson cycle* named after Tuzo Wilson) which is the basic rhythm of Earth history and divides the history of the planet into distinct chapters of supercontinental growth and decay.

The course concludes by looking at the 4 billion years long geological history of Canada and Ontario including reference to modern environmental problems facing Canadians. We will look at the complex causes and impacts of climate change, mineral exploration and mining, the impact of urban development, disposal of a wide variety of wastes, the clean-up of contaminated sites and waters, and the key role those environmental geoscientists play in our society. Some have argued that the influence of mankind on our environment is now so profound that we are now living in a different geological era referred to as the *Anthropocene*.

Learning outcomes

At the end of this course, you will know how planet Earth 'works' regardless of your course of study. This knowledge is the key to protecting our complex human world from risks and natural disasters, the need to protect the environment and to find ever scarcer resources, especially the minerals needed for a green economy and water, and extract them in an environmentally-sustainable fashion. This is a field called 'Environmental Geoscience' which is the focus of a Specialist Undergraduate Program within the

Department of Physical and Environmental Sciences (DPES) and a 12-month all-course professional Master of Environmental Science (M. Env.Sc) program.

There is a shortage of suitably qualified environmental geoscientists in Canada and abroad. The profession requires well-trained individuals and offers many diverse opportunities for a career. If you are interested in a career in geoscience see the web site of the Association of Professional Geoscientists of Ontario (pgo.ca) and how to become a P.Geo.

Hopefully after this course you will want to do more courses in geoscience and environmental science. If you need advice join us online during office hours or email the instructor.

Other notes

1) The course textbook is *Canada Rocks – The Geologic Journey*. It frames the geological history of Canada against what is known of modern global plate tectonics. Relevant chapters for each lecture are shown on the attached weekly schedule. I don't expect you to know or be examined on every detail and term in the textbook it is designed to provide background for what we do in lectures.

2) The course is organized around the *Wilson Cycle* and a useful resource is the 5-part *Geologic Journey- World* TV documentary series which aired on Canadian Broadcasting Corporation's 'The Nature of Things' in late 2010 with David Suzuki and Nick Eyles and *which is available online*. It is based on the geology of various parts of the world and you will need to watch these to supplement lectures.

Academic Integrity

The University treats cases of cheating and plagiarism very seriously. The University of Toronto's Code of Behaviour on Academic Matters (http://www.governingcouncil.utoronto.ca/policies/behaveac.htm) outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences.

Potential offences in papers and assignments include *using someone else's ideas* or words without appropriate acknowledgement, submitting your own work in more than one course without the permission of the instructor, making up sources or facts, *obtaining or providing unauthorized assistance on any assignment*.

On tests and exams cheating includes using or possessing unauthorized aids, *looking at someone else's answers during an exam or test*, misrepresenting your identity, or falsifying or altering any documentation required by the University, including (but not limited to) doctor's notes.

Evaluation and marks

The course will be evaluated by:

a) **Mid-term exam** (multiple-choice, open book): 27 marks

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b) **Completion of 10 online modules***: 40 marks

c) **Final exam** (*non-cumulative,* multiple-choice, open book): 33 marks

Exams will be based primarily on lectures and the textbook and will be held online:

If you miss a midterm or other deadline (excluding final exams), you must submit relevant paperwork BOTH through ACORN and additionally through the DPES self-declaration absence form. Please see the following link for further details: https://www.utsc.utoronto.ca/physsci/self-declaration-absence-form-0. For A-level courses, it's not permissible to transfer the value of a missed mid-term to the final exam.

Final exam absences must be declared to the Registrars office: https://www.utsc.utoronto.ca/registrar/missing-examination

If you experience any technical issues during an exam, they must be thoroughly documented by capturing screenshots of the problem.

'Open book' does NOT mean collaborative. You are not permitted to communicate with other students for any reason during any exam.

Things to make your life easier (and ours)

1. Please check Quercus regularly for updates and commonly asked Questions and Answers. I and the TAs will be available during regularly-scheduled office hours which will be announced on the course homepage.

2. We don't bell curve exam marks - ever!

3. We don't know the dates of the mid-term and final exams until we are informed of them by the Registrar's Office: we have no control over when they are scheduled. Their dates will be announced as soon as we know.

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

5. There are over 1000 students in this course, and we have a well-tried system in place that works to ensure your time with us is worry-free. It works well *so you have no reason to contact me (through the Quercus inbox)* unless *there is a pressing personal matter that is not allowing you to fulfill the needs of this cours*e.

We do welcome feedback, and we will post online office hours so come join us and introduce yourself.

Kirsten Kennedy

Module topics and dates and times of availability (Eastern Standard Time)

Each module will be posted on-line on the Monday of the relevant lecture (see lecture schedule) and you will generally have about *two weeks* to review and complete each one with *no extensions*. Note that the module 4 and 10 have slightly shorter availabilities. During the latter part of the course, there is significant overlap in the availabilities of modules. Once you have completed the module, the material will still be available thereafter for exam revision purposes, *but you will no longer have access to the questions/answers.*

1. The Plate Tectonic paradigm (available Jan 17 – Jan 31)
2. How Earth works (available Jan 24 – Feb 7)
3. Divergent plate boundaries (available Jan 31 – Feb 14)
4. Convergent plate boundaries (available Feb 7 – Feb 18) **
5. Earth Materials (available March 7 – March 21)
6. Natural Resources (available March 7 – March 21)
7. Canadian Shield (available March 14 – March 28)
8. The Paleozoic (available March 14 – March 28)
9. Pleistocene glaciations (available March 21 – April 4):
10. The Anthropocene (available March 28 – April 8) **

** Note that modules 4 and 10 are available for LESS than a full 2 weeks.

It is your responsibility to check the module schedule carefully for due dates. Also dates are subject to change based on unforeseen circumstances, it is your responsibility to check announcements regularly to ensure due dates have not changed.

The most common reasons for not completing the modules are illnesses, family emergencies, technical issues, and simply forgetting the deadline. Most issues can easily be avoided if you **start early**.

Technical issues may arise when completing quizzes online and prevent you from completing the module. These issues can be reduced by completing the modules on desktop or laptop computers rather than on mobile devices or tablets, using computers with Ethernet connection rather than Wi-Fi, using Chrome or Firefox browsers, and not leaving the module open and idle for more than 5-10 minutes. In the event of a **technical issue** with completing the module you must email Shane Sookhan at least 24 hours before the module deadline otherwise it will not be considered. If you have a grade-related query with respect to the modules, you must contact Shane no more than one week following the due date.