Earth’s Changing Climate - Earth Sc 3CC3/Envir Sc 3CC3

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Prerequisite(s): One of EARTH SC 2C03, 2E03, ENVIR SC 2C03, 2E03, ISCI 2A18, LIFE SCI 2H03; and registration in Level III or above.

Course Outline:
Global warming and abrupt climate change are some of today’s pressing global issues. This course will discuss the natural causes of past climate changes and the human impact on modern as well as future climate change. In particular, this course will focus on Earth’s climate history over the past several hundred million years, such as tectonic-scale climate change, orbital-scale climate change, and deglacial climate change. The interaction among the major components of the climate system, such as air, water, ice, land, and vegetation will also be covered.

Course Objectives: By the end of this course, students should:

- Understand the natural and anthropogenic causes of climate change.
- Discuss the interaction among the various components of the climate system.
- Gain a basic understanding of the functioning and response of the major components of climate systems.
- Be familiar with how scientists reconstruct Earth’s climate history using various climate archives.

Course Structure:

- Three 1-hour lectures per week will be given on Monday (3:30 pm - 4:20 pm), Tuesday (4:30 pm - 5:20 pm), and Thursday (3:30 pm - 4:20 pm) in JHE 376. All students are expected to attend all lectures. Only partial lecture notes will be available on Avenue-to-Learn. Therefore, it is the responsibility of the student to ensure that class notes are obtained for any classes they have missed.

Required Textbook:

Course Evaluation:

- Assignment 15%
- Two On-line Quizzes (each 8%) 16%
- Midterm Exam (cumulative, TBA) 24%
- Final Exam (cumulative, during exam period) 45%

(Late penalty for the assignment: 20% of final mark (/100%) per day)

The Assignment will be due no later than 4:20 pm on the specified due date and it should be submitted in the Earth/Envir Sc 3CC3 drop box on the 2nd floor of General Sciences Building (GSB). A cover page should be provided for the assignment and it should include: your full name, student ID number, course name and number (i.e., EARTH SC 3CC3), and the due date. Assignments submitted without ALL of this requested information will not be graded and the Instructor or T.A. will make NO attempt at identifying who is the author of an assignment. Details of the assignment will be posted on Avenue-to-Learn. The second floor of GSB locks shortly after 4:30 pm, but you can still submit assignments to the after-hours drop box located at the western end of GSB. These assignments will be collected the following day and date stamped with that date, not the date you physically submitted the assignment.

The On-line Quizzes and the Midterm Exam will consist of multiple-choice questions. The Midterm Exam will be held during one of our regular lectures, but will probably be given in various locations across the campus. It is your responsibility to verify your midterm date & location and to come to the test on time. The Final Exam will consist of a selection of multi-part short and long-answer questions.

If you fail to submit one of these evaluation components for a legitimate reason: (1) you must get proper documentation and submit it to the Associate Dean’s office of your faculty OR you can submit the McMaster Student Absence Form (MSAF), once per term, to request academic accommodation due to medical or personal situations that last up to 3 days, (2) you then must contact the Instructor in order to find out what, if any, accommodations will be made for the missed evaluation components. See Academic Regulation in the Undergraduate Calendar “Requests for Relief for Missed Academic Term Work” for details. Please note these regulations have changed beginning Fall, 2015.

Typically, your grade for the missed evaluation will be applied to the Final Exam (i.e., if you miss the Midterm Exam, the 24% will be applied to the final exam, making it worth 69% of your final mark). If you do not complete these two steps within 7 calendar days of the missed component, you will receive a grade of zero for it.

Please note that the MSAF will not be accepted for the missed On-line Quizzes because the On-line Quizzes will be available for 7 calendar days.

Grade appeal policy:

You will have 7 calendar days from the date when your grade for a particular course evaluation component (e.g., Assignment) is released to appeal your grade. If you wish to appeal a grade, you must leave a written note (including your name, McMaster email address, and student ID number) in the
Earth/Envir Sc 3CC3 drop box, stating the component that you wish to be investigated and justifying why you wish to have the evaluation reviewed. If the written request is found to be insufficiently justified (e.g., simply wanting a higher mark is insufficient), the appeal will not be investigated further.

**Attendance and E-mail policy:**

Office hours are held by the T.A. to help clarify the content of lectures. If you missed a lecture, it is not the T.A.’s responsibility to go over the entire lecture with you. It is your responsibility to acquire the necessary information from your classmates and to keep up with news, announcements, updates, and other information posted on Avenue-to-Learn.

It is not appropriate to use e-mail to ask detailed questions (including asking about what was discussed in lecture). As a general rule, you should not expect to receive answers to e-mails on weekends or late in the evening. Rather, e-mails will typically be answered during regular working hours on weekdays and as time allows. E-mails sent on either the day of the Midterm/Final Exam or on the due date of an assignment will not be answered.

As a courtesy and to ensure that your e-mails are answered properly, you must include your name and student ID number in the e-mail signature. E-mails must be sent from McMaster email accounts or they will not be read or answered. E-mails should be written in a professional manner, spell-checked, and proof-read before sending them.

**Course Schedule:** The proposed schedule may change during the term. Any changes will be announced in class.

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<tr>
<th>Week beginning</th>
<th>Lecture Topics</th>
<th>Reading</th>
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<tbody>
<tr>
<td>Sept. 4</td>
<td>Introduction/Overview of Climate Science/Appendix 1&amp;2</td>
<td>Ch. 1</td>
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<td>Sept. 11</td>
<td>Climate Archives, Data, and Models/Video #1</td>
<td>Ch. 3</td>
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<td>Sept. 18</td>
<td>CO₂ and Long-Term Climate/Plate Tectonics and Long-Term Climate</td>
<td>Ch. 4 &amp; 5</td>
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<td>Sept. 25</td>
<td>Greenhouse Climate/From Greenhouse to Icehouse <em>(Quiz #1)</em></td>
<td>Ch. 6 &amp; 7</td>
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<td>Oct. 2</td>
<td>From Greenhouse to Icehouse/Video #2</td>
<td>Ch. 7</td>
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<td>Oct. 9</td>
<td>Mid-Term Recess</td>
<td>Ch. 8 &amp; 9</td>
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<td>Oct. 16</td>
<td>Astronomical Control of Solar Radiation/Insolation Control of Monsoons</td>
<td>Ch. 9 &amp; 10</td>
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<td>Oct. 23</td>
<td>Insolation Control of Monsoons/Ice Sheets</td>
<td>Ch. 10 &amp; 11</td>
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<td>Oct. 30</td>
<td>Orbital-Scale Changes in CO₂ and CH₄/Video #3</td>
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<td>Date</td>
<td>Topic</td>
<td>Chapter(s)</td>
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<td>Nov. 6</td>
<td>Orbital-Scale Interactions, Feedbacks, and Unsolved Mysteries</td>
<td>Ch. 12 &amp; 13</td>
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<td>/Last Glacial Maximum</td>
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<td>Nov. 13</td>
<td>Climate During and Since the Last Deglaciation/Millennial Oscillations of Climate</td>
<td>Ch. 14 &amp; 15</td>
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<td>(Quiz #2)</td>
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<td>Nov. 20</td>
<td>Climate Changes During the Last 1000 years/Climate Changes Since 1850</td>
<td>Ch. 17 &amp; 18</td>
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<td>Nov. 27 &amp; Dec. 4</td>
<td>Causes of Warming over the Last 125 Years/Future Climate Change</td>
<td>Ch. 19 &amp; 20</td>
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**Academic Integrity:**

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: “Grade of F assigned for academic dishonesty”), and/or suspension or expulsion from the university.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at [http://www.mcmaster.ca/academicintegrity](http://www.mcmaster.ca/academicintegrity)

The following illustrates only three forms of academic dishonesty:

- Plagiarism (e.g., the submission of work that is not one’s own or for which other credit has been obtained).
- Improper collaboration in group work.
- Copying or using unauthorized aids in tests and examinations.