EARTH SYSTEM ANALYSIS

Course Number: SWS4180 for undergraduates/SWS5182 for graduates

Credit Hours: 3

Academic Term: Fall 2023

Class meeting time and location: Online, with Zoom Chat session is Tuesday 7:20 to 8:10 pm

INSTRUCTOR INFORMATION

INSTRUCTOR NAME: Stefan Gerber

EMAIL: sgerber@ufl.edu

PHONE NUMBER: 392-294-3174

OFFICE HOURS: Thursday 1pm to 3pm in office 3187 McCarty A, or by appointment

COURSE INFORMATION

COURSE WEBSITE: http://elearning.ufl.edu

COURSE COMMUNICATIONS: Primary tool for course related questions should be posted in the weekly discussion board. Feel free to answer questions from your class mates! For personal questions such as grades, special circumstances, needed accommodations, etc. you may use the CANVAS messaging tool. Expect a response within 24 hours.

REQUIRED TEXTBOOK: Kump, L. R., Kasting, J. F., & Crane, R. G. (2010). *The earth system* (3rd ed.). Upper Saddle River, NJ: Pearson.

RECOMMENDED TEXTBOOKS:

Jacobson, M., Charlson, R. J., Rodhe, H., & Orians, G. H. (2000). *Earth system science: From biogeochemical cycles to global changes* (Vol. 72). San Diego, CA: Elsevier Academic Press.

Bloom, A. J. (2010). *Global climate change: Convergence of disciplines*. Sunderland, MA: Sinauer Associates.

MATERIALS AND SUPPLIES FEES: N/A

COURSE DESCRIPTION: Analysis of global-scale interdependences between climate, biogeochemical cycles and humans using a systems approach.

PREREQUISITE KNOWLEDGE AND SKILLS: A minimal understanding of calculus is useful, though not a requirement (MAC 2233: Survey of Calculus 1; PHY 2048 Physics with Calculus 1, or similar).

COURSE OBJECTIVES: By the end of the course the students will be able to…

1. characterize the physical, chemical and biological mechanisms that lead to exchange of energy and matter among the major components of the Earth System (atmosphere, ocean, biosphere and lithosphere);
2. analyze interdependencies and feedbacks which operate within and among the components of the Earth System;
3. examine effects of the ongoing environmental change in the global Earth system.
4. (GRADUATE STUDENTS) quantify effects of ongoing environmental change using simple box models

INSTRUCTIONAL METHODS: Lecture videos will be offered online for each module typically 2-3 topics at approximately 10-20 minutes in length. Class meetings will be devoted to discussion, assignment pre and post discussion, consolidate course materials and student presentations. Meetings are in form of in-person or online synchronous session depending in which sections students are enrolled in.

GRADUATE STUDENTS: Graduate students will complete all undergraduate assignments. Additional assignments are given that revolve around building and applying an Earth System Model (ESM). Graduate students also will complete a semester project where they further explore and/or expand their ESM.

COURSE POLICIES

ATTENDANCE POLICY: Attendance in live classes and synchronous sessions is mandatory. I understand we are all busy and 100% attendance may not always be possible. Omitting substantial portions (> 10%) of these sessions will hamper the student's ability to complete the required homework in a satisfactory manner and will thus affect the grade. It is the student's responsibility to maintain satisfactory academic performance and attendance. Neither the Instructor nor the TA are required to cover missed materials with a student if the absence is unexcused.

ASSIGNMENT POLICY: Module assignments as well as reflective discussions in form of posts in Canvas are expected to be completed in time and will be graded. Module quizzes will be on topics covered in the readings and lecture videos.

MAKE-UP POLICY: Assignments missed for acceptable reasons must be made up. Time for make-up is typically the duration of the absence and starts with the first day of the return. Written documentation of absence must be provided. Participation in weekly discussion cannot be made up, but students may obtain full points if their absence did not allow for partial or full participation in the online discussion. While quizzes cannot be made up, points for missed quizzes can be recovered if the students provide a set of 2 quiz questions to be used in the specific module.

COURSE TECHNOLOGY: This course is facilitated online through Canvas. You may access Canvas from UF's e-Learning webpage: http://elearning.ufl.edu/. Please contact the UF Help Desk, http://helpdesk.ufl.edu, if you have any technical difficulties with Canvas.

ZOOM: The online section will conduct synchronous meetings using ZOOM. ZOOM is integrated into CANVAS. Please follow the 'Zoom Conferences' link on the right-hand side of the course menu. Recordings of the Chat's will also be posted there.

PLAYPOSIT: This course uses PlayPosit to provide interactions within the online lecture videos. When you select on a video thumbnail, the lecture video will open in a new tab for you to watch and complete the interactions (e.g., multiple choice questions, discussion forums, polling surveys, reflective pauses, etc.). Why is this course using PlayPosit? There is extensive research to support the use of interactive videos in an online environment to enhance student engagement and retention. The interactions provide an opportunity for you to assess and apply your understanding of the concepts that are being discussed in the video.

For more information on PlayPosit, please review The Student Experience. If you have any technical difficulties while using PlayPosit, please review PlayPosit Troubleshooting before contacting the UF Help Desk. Information relating to accommodations and privacy can be found at PlayPosit Accessibility and PlayPosit Privacy Policy.

VOICETHREAD INFORMATION: In this course, you will create several narrated presentations. In order to share these presentations with your classmates and instructor, you will utilize VoiceThread.

First, you will need to sign in to https://ufl.voicethread.com/ with your Gatorlink username and password. Next, join the VoiceThread Course Group (the link is provided in Canvas). You MUST join the course group!

Once you join the group you will receive a confirmation message.

HELPFUL RESOURCES:

- How to create a VoiceThread
- How to upload your PowerPoint to VoiceThread
- How to narrate a VoiceThread
- How to create a VoiceThread share link

For more tutorials, please review VoiceThread Web Application. If you have any technical difficulties while using VoiceThread, please review VoiceThread Troubleshooting before contacting the UF Help Desk. Information relating to accommodations and privacy can be found at VoiceThread Accessibility and VoiceThread Privacy.

ONLINE COURSE EVALUATION: Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at https://evaluations.ufl.edu. Evaluations are typically open during the last two or three weeks of the semesters, but students will be given specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results.

UF POLICIES

UNIVERSITY POLICY ON ACCOMMODATING STUDENTS WITH DISABILITIES: Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the

instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

UNIVERSITY POLICY ON ACADEMIC CONDUCT: UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Student Honor Code specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

CLASS DEMEANOR OR NETIQUETTE: All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions, and chats. Review the Netiquette Guide for Online Courses for expected student behavior.

SOFTWARE USE: All faculty, staff, and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

STUDENT RECORDING OF LIVE CLASSES AND ONLINE SYNCHRONOUS SESSIONS

Students are allowed to record video or audio of live class meetings or live (synchronous) online lessons. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic

exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040

GETTING HELP AND RESOURCES

For issues with technical difficulties for Canvas, please contact the UF Help Desk at http://helpdesk.ufl.edu or (352) 392-HELP (4357).

Any requests for make-ups due to technical issues MUST be accompanied by the ticket number received from the Help Desk when the problem was reported to them. The ticket number will document the time and date of the problem. You MUST e-mail your instructor within 24 hours of the technical difficulty if you wish to request a make-up.

Other resources are available at Distance Learning's Getting Help for:

- Counseling and Wellness resources
- Disability resources
- Resources for handling student concerns and complaints
- Library Help Desk support

Should you have any complaints with your experience in this course, please visit Distance Learning's Student Complaint Process to submit a complaint.

GRADING POLICIES

METHODS BY WHICH STUDENTS WILL BE EVALUATED AND THEIR GRADE DETERMINED: Students will be assessed based on their assignments, quizzes and participation in weekly online reflective discussions.

COURSE GRADING POLICY: Grades will be determined based on your performance on the following activities:

Items	Percentage Weight
Assignments	70
Module Quizzes	20
Reflective Discussions	10

GRADING SCALE: For more information, review Frequently Asked Questions for Minus Grades.

Percent	Grade
95.0 – 100.0	A
90.0 – 94.9	A-
85.0 – 89.9	B+
80.0 – 84.9	B
75.0 –79.9	B-
70.0 – 74.9	C+
65.0 – 69.9	C
60.0 – 64.9	C-
55.0 – 59.9	D+
50.0 – 54.9	D
45.0 – 49.9	D-
0 – 44.9	E

COURSE SCHEDULE

DUE DATES: All modules open on Mondays at 12 AM ET.

All discussions (initial posts), quizzes, and assignments are due by **11:59 PM ET on Fridays**.

Discussion comments/responses are due by **11:59 PM ET on Sundays**.

Check the Canvas Assignments or Canvas Calendar for specific due dates.

A WEEKLY SCHEDULE OF TOPICS AND ASSIGNMENTS:

Week/Date	Topic	Reading	Assignment
1	Course Orientation Introduction into System Analysis	Syllabus Textbook Chapter 1 Crutzen & Stoermer (2000)	Introduce Yourself Course Orientation Quiz Global Water Cycle Essay The Anthropocene Quiz Introduction into System Analysis Reflection
2	Energy Balance	Textbook Chapter 2 IPCC (2013)	Peer Review Global Water Cycle Essay Greenhouse Planets Assignment Energy Balance Reflection
3		Textbook Chapter 3 Crowley (2000)	Climate Sensitivity Assignment Climate System Quiz Climate Sensitivity Reflection
4	Atmospheric Dynamics	Textbook Chapter 4 Physical Geography website	Peer Review Climate Sensitivity Assignment Daily Weather Chart Assignment Current Weather Reflection
5		Kottek, Grieser, Beck, Rudolf, & Rubel (2006)	Koeppen Assignment General Circulation Quiz Weather Elsewhere Reflection

Week/Date	Topic	Reading	Assignment
6	Ocean Circulation	Textbook Chapter 5	Ocean Circulation Assignment Warming Hiatus Reflection Ocean Circulation Quiz Climate of the Last 1000 Years
7		Rahmstorf (2006) Earth System Model	Lag in the Climate System Assignment Ocean Circulation Reflection Mid-Course Survey
8	Ocean Carbon Cycle	Textbook Chapter 8 Sigman & Hain (2012)	Ocean Carbon Cycle Quiz Global Carbon Cycle Reflection Earth System Model Development (Grads Only)
9		Sarmiento & Gruber (2006) Chapter 8	Strangelove Ocean Assignment Ocean Carbon Cycle Reflection Earth System Model Carbon Cycle Assignment
10	Terrestrial Biogeochemistry	Textbook Chapter 11 Bloom (2010)	Land Carbon Cycle Quiz Ethiopian Tree Planting Efforts Reflection
11		Luo (2007) Cramer et al. (2001)	Land Carbon Cycle Assignment Terrestrial Biogeochemistry Reflection Proposal for Final Project (Grads Only)
12	Feedback in the Climate System	Textbook Chapter 15 Friedlingstein et al. (2006) Cox, Betts, Jones, Spall, & Totterdell (2000)	Feedback Analysis Assignment Feedback in the Earth System Quiz Climate Feedback Reflection Progress Report on Final Project

Week/Date	Topic	Reading	Assignment
13	Long-Term Carbon Cycle	Archer et al. (2009)	Long Term Carbon Trajectory Quiz Weathering Reactivity Reflection
14		Camoin et al. (2012)	Holocene Coral Reef Buildup Assignment Tracking Weathering Reflection End-of-Course Survey
15	Past Climate Change	Textbook Chapter 12 Textbook Chapter 14	Paleo Archive Assignment Past Climate Change Quiz Past Climate Changes Reflection
16	Final Week		Final Project Presentations

Disclaimer: This syllabus represents my current plans and objectives. As we go through the semester, those plans may need to change to enhance the class learning opportunity. Such changes are not unusual and should be expected, but I will strive to timely communicate any changes.

Last update: 8/17/2023