Advanced Environmental Systems
Geographical Sciences 301
Spring 2023
Syllabus – Version 1.0

Instructors	Dr. Sinéad L. Farrell (she/her)	Ms. Alice Barnsdale (TA)
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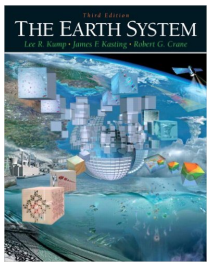
Classes Room: HJP 2242	Tu 12:30 – 1:45 pm Th 12:30 – 1:45 pm	
Office Hours	Tu 4:15 -5:00 pm (by zoom) W 10:30 – 11:15 am (by zoom)	M 2:00 – 2:30 pm (by zoom) F 3:30 – 4:30 pm (LeFrak)

I. Course Text



We are using *The Earth System*, 3rd edition, by Kump, Kasting & Crane (**ISBN:** 9780321597793). The 2nd edition will work as well (especially if you can find it cheaper). Students may also find it useful to have a copy of an introductory physical geography text, such as *Physical Geography*, 5th edition, by Mason, Burt, Muller & DeBlij (ISBN: 9780190246860).

II. Course Description

GEOG301 is an advanced course in Environmental Systems, with emphasis in physical geography and Earth System Science. The major goal of this class is to provide a fundamental understanding of physical aspects and dynamics of the Earth as a system. GEOG301 builds on the material covered in GEOG201. The class explores how the Earth as a system is changing, both in the past and present, and how it may look in the future. This course will provide students with an overview of the key elements of physical geography, including the circulation of the atmosphere and ocean, biogeography (factors and processes that control the geographical distributions of plants and animals), climatology (processes associated with controlling variations in weather and climate), and geomorphology (factors and processes that control changes to the physical structure of the earth surface in relation to geological structures). The primary course material was created by Dr. Ralph Dubayah, Dr. George Hurtt, and Donal O'Leary.

III. Course Organization

The course is organized around eight major topics: (1) Global Energy Balance and the Greenhouse Effect, which covers how the atmosphere and solar radiation interact; (2) Atmospheric Circulation - Water, Weather and Climate, which covers how the energy balance of the Earth interacts with the atmosphere and hydrosphere to produce climate and weather; (3) The Hydrosphere – Ocean Circulation, which covers how the atmosphere and oceans interact; (4) The Cryosphere – Permafrost, seasonal snow, land ice, glaciers and sea ice, which covers how cryospheric processes influence the Earth system; (5) The Biosphere - Ecosystems, including carbon and nutrient cycling and the interaction of biosphere with other Earth systems; (6) The Geosphere – Plate tectonics, earthquakes, volcanism and mass movement, which covers how geohazards shape Earth's surface and interior; (7) Climate Change, past, present and future, and the impacts of humans on the Earth system; (8) Monitoring the Earth System, including examples to illustrate integrative approaches scientists use to observe the Earth system from space.

Lectures and Reading Material

Lectures consist of material presented verbally through lectures, accompanied by projected graphics. The slide deck for each lecture will be available on ELMS-Canvas approximately 12-24 hours prior to the lecture. Instructors do not however make their lecture notes available. The course text book is meant to provide background to the lectures and each lecture is accompanied by a chapter of the textbook. While lectures cover some key concepts in the text, many new concepts are presented only through lecture material. Supplemental reading material is also assigned throughout the course via ELMS Modules.

Collaboration

Throughout the semester, students will be asked to interact in a collaborative fashion during class. Please be considerate of your classmates and instructors. Always interact with respect and collegiality. There will be a major collaborative activity in the second half of the semester based around a group project. Projects are on the topic of Earth Observation and will be assigned to student teams. The activity is designed for students to work with their teammates. Each student will submit one final project and will be asked to present one slide to the rest of the class as part of their group project. Students will receive individual scores on these activities.

The collaborative nature of this class will push you to take an active role in the learning process. You will do this by engaging and collaborating with other students and the instructor on a regular basis in the classroom, through group work and activities, and during office hours. Each student is expected to make substantive contributions to the learning experience, and attendance is expected for ALL collaborative (group work) sessions. Students with a legitimate reason to miss a lecture should communicate in advance with the instructor, except in the case of an emergency. There will be no penalty for any students unable to join a lecture for personal or other reasons. Students who miss a lecture are however responsible for learning what they have missed by watching the recorded lecture. Additionally, students must complete all readings and assignments in a timely manner to fully participate in class. Recordings of each lecture will be made available following class through ELMS-Canvas and Panopto. Students must make up for any graded in-class activities they have missed by attending office hours with the TA.

Learning Outcomes

1. To understand the fundamental laws and principles underlying the physical environment, how these control processes that occur on the land surface, in the oceans and in the atmosphere, and how these systems interact.
2. To understand the mechanisms that lead to variability in important physical characteristics such as air temperature, weather, climate, plants and other elements of the environment.
3. To describe the key components, interactions and concepts that characterize the modern Earth system.
4. To understand the causes of change in the Earth system across temporal and spatial scales.
5. To understand human impacts on Earth systems, and to have a quantitative comprehension of the role of these impacts on climate and biological resources.
6. To understand approaches for monitoring and modeling the Earth system using remote sensing, computer models, and other data.

IV. Course Requirements

Attendance is not required for this course. However, in-class participation, discussion, activities, assessments and collaborative exercises are required and graded. We therefore *strongly* suggest that students attend every lecture. There will be *eleven in-person/in-class group activities* on dates throughout the semester, and *these will all be graded*. Students must watch the recording of any lectures they were unable to attend. They must also make up for any graded in-class activities that they have missed by attending the next-available in-person office hour with the TA.

There will be *four graded homework assignments* during this course. The schedule for these assignments will be released on ELMS-Canvas. Homework assignments will be due approximately one week after they are assigned. Students may refer to the lecture slides and course textbook to complete assignments, and may work together on assignments. The final work however *must* be the student's own (i.e., course work should be in your own words, with your own drawings, and using your own calculations and must show your own work). Presenting anyone else's work as your own, even if conducted collaboratively, will be considered academic dishonesty. No late assignments will be accepted, except as allowed under University regulations and only with *prior permission*.

We will have *six graded multiple-choice quizzes*, that are strictly time-limited. No extension beyond the due date/time of the quiz is available. *This means that quizzes must be started at least 10 minutes prior the due date/time*. There will be no exceptions to the quiz deadline. Any student unable to complete the quiz before the due date/time will have their score recorded at the time of the quiz deadline.

We will have *one graded midterm exam* that will be a mix of multiple-choice, fill in the blank, short answer, complete a diagram, mathematical problems, and longer answer formats. **The midterm exam is closed-book format, and can be completed during class on March 16, 2023**. *The exam is strictly time-limited and must be completed within the scheduled class timeslot*. No extension beyond the due date/time of the midterm is available. There will be no exceptions to the midterm deadline. Any student unable to complete the midterm before the due date/time will have their score recorded at the time of the deadline.

There will be *one graded final project* in the second half of the semester on the topic of Earth Observation. This assessment is in lieu of a final exam. Students will be assigned to a collaborative team. Each team will be assigned a group project topic. The collaborative activity is designed for students to work together with their collaboration team on the group project. Each student will submit *one final project* which will be graded individually. Students will also be asked to present *one slide* to the rest of the class as part of their group project. Students will receive individual scores on this activity.

V. Course Grading

Course grades will be determined as the sum of the weighted scores of in-class activities and assessments, homework/problem sets, group assignments, quizzes and the midterm exam. There will be no final exam in Spring 2023 and the final graded project is the final assessment.

Assigned Problem Sets	**35%**
Midterm Exam	**25%**
Final Project and Presentation	**20%**
Multiple-choice Quizzes	**10%**
In-class activities and collaboration	**10%**

All assessment scores will be posted on the course ELMS-Canvas page. If you would like to review any of your grades (including the midterm exam), or have questions about how something was scored, please attend office hours or email the instructors to schedule a time to discuss the concern. Late work will ***not*** be accepted for course credit so please ***plan to have all assignments submitted well before the scheduled deadline***. If you experience an unavoidable circumstance for which you may need an extension, please contact the instructors to discuss this.

Final Grade Cutoffs									
+	97.00%	+	87.00%	+	77.00%	+	67.00%	+	
A	94.00%	B	84.00%	C	74.00%	D	64.00%	F	<60.0%
-	90.00%	-	80.00%	-	70.00%	-	60.00%	-	

VI. Course Prerequisites

Students must have completed GEOG201 and GEOG211, or their equivalent (with permission of the instructors), before taking GEOG301. Concurrent enrollment in GEOG201/211 and GEOG301 is *not* allowed. Students will not receive credit for GEOG301 if they have taken GEOG398B. Students are also expected to know algebra and how to use a scientific calculator.

VII. Academic Integrity - Course Related Policies

All assignments are to be submitted electronically by the stated deadline through ELMS-Canvas. The University expects each student to take full responsibility for their academic work and academic progress. GEOG301 follows all University of Maryland course related polices for undergraduate students with regards to areas such as academic integrity, classroom conduct, attendance, absences, missed assignments, and complaints about grading, among others. The complete list of these policies governing our course is located here: Course Related Polices.
Stay connected with the UMD community and stay updated with the latest UMD COVID-19 Information at: https://umd.edu/4Maryland.

Tips for Success

1. **Participate.** Discussions and group work are a critical part of the course. You can learn a great deal from discussing ideas and perspectives with your peers and instructors. Participation can also help you articulate your thoughts and develop critical thinking skills.
2. **Manage your time.** Make time for your learning, in-class participation, discussions and office hours. Give yourself plenty of time to complete assignments including extra time to handle any technology-related problems.
3. **Login regularly.** Log in to ELMS-Canvas several times a week to view announcements, discussion posts and replies to your posts. You may need to log in multiple times a day when group submissions are due.

4. **Do not fall behind.** This class moves at a quick pace and each week builds on the previous. It will be hard to keep up with the course content if you fall behind.
5. **Use ELMS-Canvas notification settings.** Canvas ELMS-Canvas can ensure you receive timely notifications in your email or via text.
6. **Ask for help if needed.** If you need help with ELMS-Canvas or other technology, contact DIT Support. If you are struggling with a course concept, reach out to the TA, instructor and your classmates for support. **Attend office hours** when the TA and instructor make their time available for you.

VIII. Course Communications

Communication with the Instructor

Salutation: Please refer to me as Dr. Farrell. Email: If you need to contact me, please reach out by email at sineadf@umd.edu - *always include GEOG301 in the subject line*. You may email me about academic and intellectual concerns/questions, to schedule a meeting outside of office hours, or to alert me to a scheduled absence, illness or other issue that may impact your progress. I will do my best to respond to emails within 24 hours.

ELMS-Canvas Announcements: I will send all course announcements via ELMS messaging. You must make sure that your email & announcement notifications (including changes in assignments and/or due dates) are enabled in ELMS so you do not miss any messages. You are responsible for checking your email and ELMS-Canvas inbox frequently.

Names/Pronouns and Self-Identifications

The University of Maryland recognizes the importance of a diverse student body, and we are committed to fostering inclusive and equitable classroom environments. I invite you, if you wish, to tell us how you want to be referred to both in terms of your name and your pronouns (he/him, she/her, they/them, etc.). The pronouns someone indicates are not necessarily indicative of their gender identity. Visit trans.umd.edu to learn more. Additionally, how you identify in terms of your gender, race, class, sexuality, religion, and dis/ability, among all aspects of your identity, is your choice whether to disclose (e.g., should it come up in classroom conversation about our experiences and perspectives) and should be self-identified, not presumed or imposed. I will do my best to address and refer to all students accordingly, and I ask you to do the same for all of your fellow Terps.

Communication with Peers

With a diversity of perspectives and experience, we may find ourselves in disagreement and/or debate with one another. It is important that we conduct ourselves in a professional manner and that we work together to foster and preserve a virtual classroom environment in which we can respectfully discuss and deliberate controversial questions. This course is not the space for hate speech, harassment, and derogatory language. I will make every reasonable attempt to create an atmosphere in which each student feels comfortable voicing their argument without fear of being personally attacked, mocked, demeaned, or devalued. Any behavior (including harassment, sexual harassment, and racially and/or culturally derogatory language) that threatens this atmosphere will not be tolerated. Please alert me immediately if you feel threatened, dismissed, or silenced at any point during our semester together and/or if your engagement in discussion has been in some way hindered by the learning environment.

IX. Course Schedule†

Lecture	Chapter to Read	Date	Topic
Section I: Origins of Life on Earth			
1	10	Thursday, January 26, 2023	Class Introduction: The Earth System
2	11	Tuesday, January 31, 2023	Origins of the Earth and Life on Earth (*Group Work Day)
Section II: Global Energy Budget and Greenhouse Effect			
3	3	Thursday, February 2, 2023	Radiation and Radiation Laws
4	3	Tuesday, February 7, 2023	Planetary Energy Balance Models (*Group Work Day)
5	3	Thursday, February 9, 2023	Atmospheric Structure and the Greenhouse Effect
6	3	Tuesday, February 14, 2023	Greenhouse Gases (*Group Work Day)
7	3	Thursday, February 16, 2023	Global Energy Budget
Section III: Atmospheric Circulation			
8	4	Tuesday, February 21, 2023	Hydrologic Cycle and Atmospheric Moisture
9	4	Thursday, February 23, 2023	Adiabatic Processes
10	4	Tuesday, February 28, 2023	General Atmospheric Circulation (*Group Work Day)
Section IV: The Oceans			
11	5	Thursday, March 2, 2023	Global Ocean Circulation
12	5	Tuesday, March 7, 2023	Oceans and Climate (*Midterm Info Day)
Section V: The Cryosphere			
13	6	Thursday, March 9, 2023	Polar Climate Change (*Group Work Day)
14	6	Tuesday, March 14, 2023	Sea Ice and Climate
		Thursday, March 16, 2023	*****Midterm Exam in HJP Room 2242*** (*attendance required)**
SPRING BREAK			
Section VI: Earth Observation I			
15	1	Tuesday, March 28, 2023	Intro Earth Observation & Project Assignments (*Group Work Day)
Section VII: The Biosphere			
16	9	Thursday, March 30, 2023	Biosphere and Ecosystems
17	8	Tuesday, April 4, 2023	Nutrient Cycles (*Group Work Day)
Section VIII: The Geosphere			
18	7	Thursday, April 6, 2023	The Dynamic Earth
19	7	Tuesday, April 11, 2023	Geohazards (*Group Work Day)
Section IX: Climate Change			
20	14	Thursday, April 13, 2023	Climate Change: Past & Present
21	15	Tuesday, April 18, 2023	Feedbacks and Future Climate
22	16	Thursday, April 20, 2023	Climate Change Mitigation
Section VI: Earth Observation II			
		Tuesday, April 25, 2023	Group Project Work in HJP Room 2242 (*Group Work Day)
		Thursday, April 27, 2023	Group Project Work in HJP Room 2242 (*Group Work Day)
		Tuesday, May 2, 2023	**Earth Observation - Collaborative Group Project Presentations***
		Thursday, May 4, 2023	**Earth Observation - Collaborative Group Project Presentations***
23		Tuesday, May 9, 2023	Climate Change Solutions (*Group Work Day)
24		**Thursday, May 11, 2023**	Course Wrap Up
			**** Indicates that YOUR attendance at class is required***

†**Note**: This is a draft schedule, and subject to change as necessary! Please monitor the course pages on ELMS-Canvas for the most up-to-date schedule and deadlines. **Classes highlighted in light or dark yellow, and/or those highlighted with bold font, are <u>mandatory</u> and all students must attend class**. In the unlikely event of a prolonged university closing, or an extended absence from the university, adjustments to the course schedule, deadlines, and assignments will be made based on the duration of the closing and the specific dates missed.

X. Course Evaluation

Please submit a course evaluation through CourseEvalUM in order to help faculty and administrators improve teaching and learning at Maryland. All information submitted to CourseEvalUM is confidential. Campus will notify you when CourseEvalUM is open for you to complete your evaluations for spring semester courses. Please go directly to the **Course Eval UM website** to complete your evaluations. By completing all of your evaluations each semester, you will have the privilege of accessing through Testudo, the evaluation reports for the thousands of courses for which 70% or more students submitted their evaluations.

XI. UMD Resources & Accommodations

Accessibility and Disability Services

The University of Maryland is committed to creating and maintaining a welcoming and inclusive educational, working, and living environment for people of all abilities. The University of Maryland is also committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs, or activities of the University, or be subjected to discrimination. The **Accessibility & Disability Service (ADS)** provides reasonable accommodations to qualified individuals to provide equal access to services, programs and activities. ADS cannot assist retroactively, so it is generally best to request accommodations several weeks before the semester begins or as soon as a disability becomes known. Any student who needs accommodations should contact me as soon as possible so that I have sufficient time to make arrangements. For assistance in obtaining an accommodation, contact Accessibility and Disability Service at 301-314-7682, or email them at **adsfrontdesk@umd.edu**. Information about **sharing your accommodations with instructors**, **note taking assistance** and more is available from the **Counseling Center**.

Student Resources and Services

Taking personal responsibility for your own learning means acknowledging when your performance does not match your goals and doing something about it. I hope you will come talk to me so that I can help you find the right approach to success in this course, and I encourage you to visit **UMD's Student Academic Support Services website** to learn more about the wide range of campus resources available to you. You should also know there are a wide range of resources to support you with whatever you might need (**UMD's Student Resources and Services website** may help). If you feel it would be helpful to have someone to talk to, visit **UMD's Counseling Center** or **one of the many other mental health resources on campus**.

Basic Needs Security

If you have difficulty affording groceries or accessing sufficient food to eat every day, or lack a safe and stable place to live, please visit **UMD's Division of Student Affairs website** for information about resources the campus offers you and let me know if I can help in any way.