

Course Syllabus

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About This Course

CLIM 614 Land-Climate Interactions – Spring 2026

TR 10:30-11:45am – Research Hall 281 “COLA Conference Room”

CRN **10998**

Instructor: Prof. Paul Dirmeyer pdirmeye@gmu.edu (<mailto:pdirmeye@gmu.edu>)

Office Hours: *By appointment*

Course Description:



This is an interdisciplinary course providing detailed description of surface energy and water balance over land and radiative and turbulent transfer. Introduces numerical techniques for modeling land surface and applications in weather, climate, and hydrologic forecasting and simulation. Includes hands-on experience with computational land surface modeling, including sensitivity experiments to reinforce theoretical concepts. Exposure to contemporary research through reading and reviewing seminal journal papers. May not be repeated for credit.




Learning Objectives:


1. Understanding of surface water and energy balances between land and atmosphere.
2. Understanding of the hydrologic, thermal, radiative and dynamical interactions between land and atmosphere.
3. Ability to perform rigorous calculations and analysis of data.
4. Developing intuition and empirical understanding along with technical expertise.
5. Familiarity with the evolution of the field of research and its current state of the art.

Course and Text:

The course will be conducted in class as regular bi-weekly meetings. Before each class, students should read the assigned material, return comments in markup form (on the PDFs using Adobe Acrobat or Reader) as uploaded files attached to weekly discussions, and come to class with questions and comments. The format of class is a “round table” discussion of the reading material, which are chapters and sections of a textbook in preparation by Prof. Dirmeyer and Dr. Eleanor Blyth called “The Land-Atmosphere System”.

Here is an **outline of the book** (<https://canvas.gmu.edu/courses/63010/files/21057290?wrap=1>)  

(https://canvas.gmu.edu/courses/63010/files/21057290/download?download_frd=1) , and the **philosophy of the textbook** (<https://canvas.gmu.edu/courses/63010/files/20941207?wrap=1>)  (https://canvas.gmu.edu/courses/63010/files/20941207/download?download_frd=1) .

Chapters will be posted here weekly. There is also a **spreadsheet of useful information** 

(https://1drv.ms/x/c/6ed93c8f6e971bda/IQDPdZ3HQ88ZSrBt_Lpoi7SAejl_nUbK_j2gZxKgPzYb4M?e=8h3clj) including a glossary, table of abbreviations, list of notation for variables, and a table of units that we will continue to update with your input.

Assignments:

As a graduate course in a research-oriented science, the course is geared toward providing **informational instruction** as well as **scientific research experience**. The former is accomplished via reading and in-class discussion. The latter occurs through associated computational homework assignments, which are exploratory in nature, and two journal paper presentations. In one presentation, the student takes the role of co-author of a published paper, presenting the work as if at a scientific conference. In the second presentation, the student is in the role of providing a critical peer-review of the scientific paper. There are also midterm and final



exams, required as CLIM 614 is a core course in the Climate Dynamics graduate program – the final exam quantifies instructional rubrics for the curriculum.

Grading:

Homework:	32% (8 assignments, 4% each)
Reading Feedback:	25% (1% per class)
Mid-Term Exam:	8%
Paper Presentations:	20% (10% oral, 10% written report)
Final Exam:	15%

The **standard graduate grading scale** (<https://catalog.gmu.edu/policies/academic/grading/#ap-3-2>) is used.

Final grade out of 100 points (grade curves may be applied)

A+	A	A-	B+	B	B-	C	F
≥97	<97; ≥93	<93; ≥90	<90; ≥87	<87; ≥83	<83; ≥80	<80; ≥70	<70

Weekly Calendar (subject to change)

Date	Reading	Topic	Assignment	Due
Prior to class	1.1-1.2 (https://canvas.gmu.edu/courses/63010/files/21059059?wrap=1) ↓ (https://canvas.gmu.edu/courses/63010/files/21059059/download?download_frd=1) 📄, 8.1-8.3 (https://canvas.gmu.edu/courses/63010/files/21059060?wrap=1) ↓ (https://canvas.gmu.edu/courses/63010/files/21059060/download?download_frd=1) 📄	Systems as a Concept, L-A System Science		
20 Jan	2.1-2.4 (https://canvas.gmu.edu/courses/63010/files/21059061?wrap=1) ↓ (https://canvas.gmu.edu/courses/63010/files/21059061/download?download_frd=1) 📄	The Global L-A System	Homework #0	27 Jan
22 Jan	9.1-9.5 (https://canvas.gmu.edu/courses/63010/files/21456858?wrap=1) ↓ (https://canvas.gmu.edu/courses/63010/files/21456858/download?download_frd=1) 📄	Climate Drivers		
27 Jan	3.1-3.6 (https://canvas.gmu.edu/courses/63010/files/21799958?wrap=1) ↓ (https://canvas.gmu.edu/courses/63010/files/21799958/download?download_frd=1) 📄	The Tropics	Homework #1	5 Feb
29 Jan	10.1, 14.1, 10.4 (https://canvas.gmu.edu/files/folder/courses_63010/Chapter%20PDFs?preview=21805207)	Momentum, Water Balance at the Land Surface		
3 Feb	14.3 (https://canvas.gmu.edu/courses/63010/files/21958459?wrap=1) ↓ (https://canvas.gmu.edu/courses/63010/files/21958459/download?download_frd=1) 📄	Water Balance (cont'd)	Homework #2	15 Feb



5 Feb	4.1-4.6	Subtropics		
10 Feb	10.3	Energy Balance at the Land Surface		
12 Feb	14.2	Energy Balance (cont'd)	Homework #3	25 Feb
17 Feb	5.1-5.6	Midlatitudes		
19 Feb	15.1	Exchanges in the Atmosphere; Thermodynamics		
24 Feb	15.2-15.3	Boundary Layers and Turbulence	Homework #4	6 Mar
26 Feb	11.1-11.3, 14.4	Carbon Balance at the Land Surface		
3 Mar	6.1-6.6	Cold climates, Journal Papers Assignment discussed	Papers Review	21, 23 Apr
5 Mar		Mid-Term		
	9-13 Mar	Spring Break		
17 Mar	10.2	Radiative Transfer		
19 Mar	16.1-16.4	Radiative Transfer and Vegetation	Homework #5	30 Mar
24 Mar	10.6	Soil Physics		
26 Mar	17.1-17.3	Soil Physics (cont'd)		
31 Mar	17.4-17.6	Soil Physics (cont'd)	Homework #6	8 Apr
2 Apr	12.1-12.2	Land-Atmosphere Coupling Metrics		
7 Apr	12.3-12.4	Land-Atmosphere Coupling Metrics (cont'd)		
9 Apr	12.5	Land-Atmosphere Coupling Metrics (cont'd)	Homework #7	29 Apr
14 Apr	19.1	Models of Land Systems		



16 Apr	19.2	Assembling a Model		
21 Apr		Paper Presentations I		
23 Apr		Paper Presentations II		
28 Apr	19.3-19.5	Modeling Boundary Layers & Coupling		
30 Apr	7.1-7.4	Past and Future		
12 May		<u>Final Exam</u>		

Legend
with Dr. Blyth
Presentations in class
No class
Exam

Students with Disabilities:

If you are a student with a disability and you need academic accommodations, please see me and contact the Office of Disability Services (ODS) at 993-2474, <http://ods.gmu.edu> (<http://ods.gmu.edu>). All academic accommodations must be arranged through the ODS.

GMU Email:

All George Mason students are issued an e-mail account. Students must use their university-provided email account to receive important University information, including messages related to this class.

Academic Integrity

Please refer to the University's [policy on academic standards](https://catalog.gmu.edu/policies/academic-standards/) (<https://catalog.gmu.edu/policies/academic-standards/>) and be familiar with it. Specifically for this course:

Homework Assignments:

Discussions about coursework inside and outside of the classroom with me or your fellow students are encouraged, and you may study and work on homework assignments together.

Artificial Intelligence:

Mason guidelines for the use of AI (<https://www.gmu.edu/ai-guidelines/ai-guidelines-students>) in courses should be understood and followed by all students.

Student privacy:

Student privacy and rights are described under the Family Educational Rights and Privacy Act (FERPA; see: <https://registrar.gmu.edu/ferpa> (<https://registrar.gmu.edu/ferpa>)).



Where to Get Help:

If you encounter any difficulties in this course, first contact your instructor **immediately!** Do not wait until the end of the semester to ask for help in understanding the material in order to improve your grade - by then, it may be too late. Do not be afraid to ask for help - that is your professor's job!

The **Counseling Center** (<https://caps.gmu.edu/>) is committed to improving academic and personal skills and offers many workshops counseling groups throughout the semester.



Make use of the many rich academic and personal opportunities available at Mason!

