Course Change Request

New Course Proposal

Date Submitted: 04/30/18 9:27 am

Viewing: CLIM 680 : Climate Data

Last edit: 04/30/18 9:27 am

Changes proposed by: bklinger

Are you completing this form on someone else's behalf?
No

Effective Term: Fall 2018

Subject Code: CLIM - Climate Dynamics **Course Number:** 680

Bundled Courses:

Equivalent Courses:

Catalog Title: Climate Data

Banner Title: Climate Data

Will section titles vary by semester? No

Credits: 3

Schedule Type: Lecture

Hours of Lecture or Seminar per week: 3

Repeatable: May only be taken once for credit (NR)

Default Grade Mode: Graduate Regular

Recommended Prerequisite(s):

Recommended Corequisite(s):

Required Prerequisite(s) / Corequisite(s) (Updates only):

Registrar's Office Use Only - Required Prerequisite(s)/Corequisite(s):

And/Or	(	Course/Test Code	Min Grade/Score	Academic Level	)	Concurrency?

Registration Restrictions (Updates only):

Registrar's Office Use Only - Registration Restrictions:

Field(s) of Study:

Class(es):

Level(s):

Degree(s):

School(s):

Catalog Description: How to process, analyze, and interpret environmental data for climate and related disciplines. Familiarizes students with software commonly used in atmospheric research and with techniques for working with large quantities of data. Examines mathematical tools for characterizing global physical data sets which vary in time and space, and applies the tools to observations and numerical model output.

Justification: Climate data, often large data sets with global coverage and high-frequency time-dependence, is an essential part of climate science. One of the two tracks for the proposed Climate Science MS is "Climate

In Workflow

1. AOES Chair
2. SC Curriculum Committee
3. SC Associate Dean
4. Assoc Provost-Graduate
5. Registrar-Courses
6. Banner

Approval Path

1. 04/30/18 9:30 am Jim Kinter (ikinter): Approved for AOES Chair

Data," which trains masters students in a number of techniques relevant to processing and analyzing climate. This is a core course for the concentration. Students in the Climate Modeling concentration or in the Climate Dynamics PhD who do not have prior experience working with climate data may want to take this course as an elective.

Key skills for handling climate data include
1) ability to find data and use appropriate software for processing it,
2) knowledge of basic techniques for displaying and summarizing data,
3) familiarity with mathematical techniques to investigate more subtle properties of typical climate data sets
Therefore the course goals and electives fall into these three categories

Does this course cover material which crosses into another department? No

Learning Outcomes:

Upon completion of this course, students will be able to:
1. Work comfortably in a Unix environment.
2. Make maps of observational and/or model data using several different common languages/tools (e.g. GraDS, Matlab, R, NCL, Python, Ferrett).
3. Work comfortably with large datasets in a variety of common formats (i.e. not text data)
4. Calculate climatologies and anomalies of monthly and daily data.
5. Compare and graph the comparison of two climate model simulations in terms of monthly and seasonal means and variances, autocorrelation, power spectra, regressions between a climate index and global fields, composites, and climate patterns calculated via EOFs.
6. Compare climate model simulations in terms of monthly and seasonal means and variances, autocorrelation, power spectra, regressions between a climate index and global fields, composites, and climate patterns calculated via EOFs.
7. Calculate statistical significance (i.e. t-test, f-test) with above comparisons and graph with a mask.
8. Access common climate data portals (i.e. PCMDI, ESG, IRIDL) and download observations and climate model datasets.

Attach Syllabus (PDFs only) clim680syllabus2.pdf

Additional Attachments (PDFs only)

Staffing: All Climate Dynamics faculty in AOES Department (about 10 members) can teach course.

Relationship to Existing Programs: Required course for Climate Data concentration of proposed Climate Science MS.
Elective for Climate Dynamics PhD.

Relationship to Existing Courses: For students who do not have prior experience working in a unix environment or with software typically used for data analysis, forms a good introduction to take before CLIM 762 Statistical Methods in Climate Research and/or CSI 690 Numerical Methods.

Additional Comments:

Reviewer Comments

Key: 15904

CLIM 680 Climate Data

Semester: TBD
Class Day/Time: TBD

Instructor: TBD
Location: TBD

Website: TBD. *Office Hours:* TBD

Catalog Description

How to process, analyze, and interpret environmental data for climate and related disciplines. Familiarizes students with software commonly used in atmospheric research and with techniques for working with large quantities of data. Examines mathematical tools for characterizing global physical data sets which vary in time and space, and applies the tools to observations and numerical model output.
Course Credits: 3 *Prerequisites:* None.

Course Structure and Grading Criteria

Homework (50%): weekly data analysis problem.
Semester Project (50%): apply a wide range of analysis tools discussed in class to a climate data set that has not been used in class.

Course Goals and Objectives

Upon completion of this course, students will be able to:
1. Work comfortably in a Unix environment.
2. Make maps of observational and/or model data using several different common languages/tools (e.g. GraDS, Matlab, R, NCL, Python).
3. Work comfortably with large datasets in a variety of common formats (i.e. not text data)
4. Calculate climatologies and anomalies of monthly and daily data.
5. Compare and graph the comparison of two climate model simulations in terms of monthly and seasonal means and variances, autocorrelation, power spectra, regressions between a climate index and global fields, composites, and climate patterns calculated via EOFs.
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7. Calculate statistical significance (i.e. t-test, f-test) with above comparisons and graph with a mask.
8. Access common climate data portals (i.e. PCMDI, ESG, IRIDL) and download observations and climate model datasets.

Students will complete this course with a “toolbox” of codes and methods for analysis of observational and climate model data.

Course Weekly Schedule

1. Review of Unix and using local computer systems
2. Review of programming concepts: loops, conditionals, functions, I/O, arrays, and strings
3. Introduction to common programming languages used in climate research: Matlab, Python, GraDS, R, NCL
4. Climate datasets and common formats, useful tools for working with different data formats
5. Climatology, anomalies, and basic graphing skills
6. Comparing two climate model simulations: annual and seasonal means, standard deviations, statistical significance, advanced graphing skills
7. Comparing two climate model simulations: composites, regressions, and their significance.
8. Comparing two climate model simulations: autocorrelation, power spectra, EOFs, common climate indices.
9. Comparing models with observations: observational datasets, accessing via common data portals, understanding the datasets, common challenges in working with observational datasets.
10. Comparing models with observations: annual and seasonal means, standard deviations, statistical significance
11. Comparing models with observations: autocorrelation, power spectra, EOFs, common climate indices.
12. Putting it all together: testing and automation using scripts
13. Additional data challenges: Daily data, filtering
14. Additional data challenges: Working with forecast and re-forecast datasets
15. Present final projects

Some Important Mason Policies

Updated Spring 2016

Electronic Communications

Students must use their MasonLive email account to receive important University information, including communications related to this class.

Disability Accommodations

If you have a documented learning disability or other condition that may affect academic performance you should: 1) make sure this documentation is on file with **Office of Disability Services** to determine the accommodations you need; and 2) talk with me to discuss your accommodation needs.

Office of Disability Services: http://ods.gmu.edu

Academic Integrity

The integrity of the University community is affected by the individual choices made by each of us. Mason has an Honor Code with clear guidelines regarding academic integrity.

Three fundamental and rather simple principles to follow at all times are that:

1. all work submitted be your own;
2. when using the work or ideas of others, including fellow students, give full credit through accurate citations; and
3. if you are uncertain about the ground rules on a particular assignment, ask for clarification.

No grade is important enough to justify academic misconduct. Plagiarism means using the exact words, opinions, or factual information from another person without giving the person credit. Writers give credit through accepted documentation styles, such as parenthetical citation, footnotes, or endnotes. Paraphrased material must also be cited, using MLA or APA format. A simple listing of books or articles is not sufficient. Plagiarism is the equivalent of intellectual robbery and cannot be tolerated in the academic setting. If you have any doubts about what constitutes plagiarism, please see me.

Office of Academic Integrity: http://oai.gmu.edu/
Honor Code: http://oai.gmu.edu/the-mason-honor-code-2/

Mason Diversity Statement

George Mason University promotes a living and learning environment for outstanding growth and productivity among its students, faculty and staff. Through its curriculum, programs, policies, procedures, services and resources, Mason strives to maintain a quality environment for work, study and personal growth.

An emphasis upon diversity and inclusion throughout the campus community is essential to achieve these goals. Diversity is broadly defined to include such characteristics as, but not limited to, race, ethnicity, gender, religion, age, disability, and sexual orientation. Diversity also entails different viewpoints, philosophies, and perspectives. Attention to these aspects of diversity will help promote a culture of inclusion and belonging, and an environment where diverse opinions, backgrounds and practices have the opportunity to be voiced, heard and respected.

The reflection of Mason's commitment to diversity and inclusion goes beyond policies and procedures to focus on behavior at the individual, group and organizational level. The implementation of this commitment to diversity and inclusion is found in all settings, including individual work units and groups, student organizations and groups, and classroom settings; it is also found with the delivery of services and activities, including, but not limited to, curriculum, teaching, events, advising, research, service, and community outreach.

Acknowledging that the attainment of diversity and inclusion are dynamic and continuous processes, and that the larger societal setting has an evolving socio-cultural understanding of diversity and inclusion, Mason seeks to continuously improve its environment. To this end, the University promotes continuous monitoring and self-assessment regarding diversity. The aim is to incorporate diversity and inclusion within the philosophies and actions of the individual, group and organization, and to make improvements as needed.