

CLIM 752: Ocean General Circulation

Instructor: Barry A. Klinger (bklinger@gmu.edu)

<http://mason.gmu.edu/~bklinger/clim752home.html> , Research Hall 116, 3-9227

Office Hours: By request. Generally on campus Mon-Thu 8:30-3:00.

Spring 2019: MW 10:30 – 11:45, Research Hall 121

Course Description

The goal of the class is to better understand the general circulation of the ocean and how it influences climate. In order to understand the ocean's role in climate, we must go beyond barotropic models to understand the three-dimensional ocean circulation. Some questions examined by the class: What determines the strength of the deep meridional overturning? What determines the locations of deep water formation in the global ocean? Can the large-scale structure of the ocean undergo catastrophic change? How does the wind generate shallow overturning cells? How might overturning cells contribute to climate variability? What are the relationships between overturning, heat transport, and atmospheric temperature?

While a moderate amount of math is necessary to describe most of the topics, the focus of the class will be on principles and concepts rather than mathematical techniques. See separate **Schedule** document for course topics.

Reading Reading: Klinger and Haine, 2017: [*Ocean Circulation in Three Dimensions*](#)

Suggested Reading:

Pedlosky, 1996: *Ocean Circulation Theory*, Springer-Verlag.

Schmittner, Chiang and Hemming, eds., 2007: *Ocean Circulation, Mechanisms and Impacts*, American Geophysical Union

Siedler, Church, and Gould, ed., 2001: *Ocean Circulation and Climate*, Academic Press

Tomczak and Godfrey, 1994: *Regional Oceanography: An Introduction* , Pergamon Press

Van Aken, 2007: *The Oceanic Thermohaline Circulation, An Introduction*, Springer.

Vallis, 2006: *Atmospheric and Oceanic Fluid Dynamics*, Cambridge University Press.

Homework and Exams

Student grade is based on

- [25%] problem sets, every week or two
- [25%] term paper
- [20%] midterm
- [30%] final exam (closed-book and in-class during finals week)

Collaboration policy (see "Academic Integrity" in this syllabus)

- Problem Sets: students are encouraged to discuss with classmates in order to better understand the material, but may not copy answers from others.
- Final Exam: once exam is distributed, and until exam is returned to instructor, student must rely 100% on student's own memory except as explicitly allowed by instructor.
- Term Paper: student may discuss with others, but the paper must be the student's own work as described by GMU policies.

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.