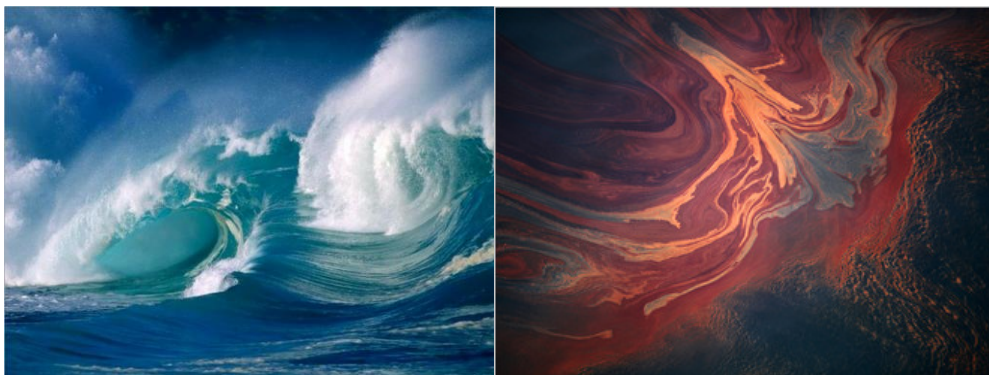


GEOL4465/5465 Physical Oceanography and Limnology



Instructor: Arne Winguth, Associate Professor

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Office Hours: Monday 12:00 pm - 1:00 pm & Wednesday 12:00 pm - 1:00 pm or after appointment

Section Information:

Lecture GEOL4465/5465-001

Lab GEOL4465/5465-011

Time and Place of Class Meetings:

Lecture: Monday & Wednesday 2:30 pm – 3:50 pm, Geosciences Room 233

Lab: Monday, 1:00 pm – 2:20 pm, Geosciences Room 202

Required Textbooks and Other Course Materials: Stewart, R., Introduction to Physical Oceanography, Pdf provided on Blackboard.

Additional books recommended:

Talley L.D., G.L. Pickard, W.J.Emery, J.H. Swift, 2011. Descriptive Physical Oceanography: An Introduction (Sixth Edition), Elsevier, Boston, 560 pp.

Open University Course Team, 2001. Ocean Circulation, Publisher: Butterworth-Heinemann, Paperback, 240pp, Series: Open University Oceanography Ser., ISBN: 0080363695 online <http://www.sciencedirect.com/science/book/9780750652780>

Pond, S., and G.L. Pickard, 1983. Introductory Dynamical Oceanography. 2nd edition, 329pp, Butterworth-Heinemann.

ISBN 10: 0-7506-2496-5

Marshall, J. and R. Plumb, 2008. Atmosphere, Ocean and Climate Dynamics –Academic Press, ISBN 9780125586917

Description of Course Content: This course offers an introduction to physical processes in the oceans. The oceans are an important part of the global climate system. Changes in the global climate system, such as global warming, do influence the immense amount of heat, moisture, and momentum stored in the ocean. In this course, we will introduce some elementary knowledge of the ocean, its circulation, and its impact on the global climate. Prerequisites: general physics, and calculus or cons. instr.

Student Learning Outcomes: After completion of this class, students will be familiar with the key terminology pertaining to the oceans and will have a well-rounded understanding of the major physical process in oceanography as well as the complex interactions among the various components of the climate system. The student will be able to:

- Identify reasons why ocean sciences are important and affect, e.g., our lives and the world economy.
- Explain the major features of the seafloor.
- Summarize the major physical and chemical properties of seawater and how each affects the ocean circulation
- Understand the feedbacks of the ocean's processes with processes in other components of the Earth's climate system (atmosphere, terrestrial biosphere, cryosphere, and geosphere).
- Analyze the atmospheric circulation system.
- Understand principles of the ocean circulation (due to friction, rotation of the Earth, and pressure changes)
- Analyze the wind-driven and density-driven ocean/lake circulation
- Quantify turbulence and its impact on the ocean/lake circulation.
- Describe the principles involved in the generation of waves and tides and evaluate their effects on coastal/lake processes and energy generation.
- Identify the consequences of a rise in sea level on the coastal zone and society, and possible mitigation and adaptation strategies.
- Identify major factors leading to climate change, and assess future climate projections.
- Discuss the societal relevance of physical oceanography and limnology for global and regional initiatives and political decisions.

This knowledge will enable the students to better understand topics of great societal importance, such as future climate change, tsunamis, large-scale propagation of pollutants, and environmental sustainability.

**Course Schedule GEOL 4465/5465 Physical Oceanography & Limnology
Spring 2018**

“As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course.” –Arne M.E. Winguth 01/17/18

Chapter	Days	Topics	Reading Text ¹	Problem Sets
1	Jan. 17, 22	Introduction and Historical Review	1-2	
2	Jan. 24	Physiography of the Oceans Dimensions, bathymetry, echosounding	3	Introduction
3	Jan. 29 Jan. 31	Atmosphere Radiation, wind system, wind stress	4	#1: Ch. 2
4	Feb. 5 Feb. 7	Oceans Heat Budget Heat budget and transport, and its variability	5	#2: Ch. 3
5	Feb. 12 Feb. 14	Temperature, Salinity, and Density Measurements and concepts	6	#3: Ch.4
6	Feb. 19 Feb. 21	Equations of Motions Momentum and mass conservation	7	#4: Ch. 5
7	Feb. 26 Feb. 28	Turbulence and Mixing Molecular viscosity and eddy viscosity	8	#5: Ch. 6
1. EXAM	Mar. 5	Material Chapter 1-5	1-7	
8	Mar. 7,	Response of Currents to Wind Ekman transport, Langmuir circulation	9	#6: Ch. 7&8
	Mar. 12 -16	Spring Break		
9	Mar. 19	Geostrophic Currents Hydrostatic equilibrium and geostrophy	10	
Fieldtrip	Mar. 24	Lake Fieldtrip 8:00-17:00 (Rain date Mar. 25)	Notes	8:30 am – 5:00 pm
10	Mar. 21 Mar. 26	Wind Driven Circulation Sverdrup & Munk theory, equatorial currents	11, 14	#7: Ch. 9&10
11	Mar. 28,	Deep Sea Circulation Stommel and Aron theory	13	#8: Ch. 11
2. EXAM	Apr. 2	Material Chapter 6-10	7-12	
12	Apr. 4, Apr. 9, Apr. 11	Waves & Tides Wave characteristics, tsunamis, tides	16	#9: Ch. 12
13	Apr. 16, Apr. 18	Limnology Theory of physical limnology	17	#10. Ch. 13
14	Apr. 23, Apr.25, Apr. 30	Climate Change & Variability Present and future, ENSO, AMO, PDO	14, 15 & notes	
Paper	Apr. 30	Final Due Date Project Paper		
15	May 2	2:00 pm - 3:20 pm Review 12:00 pm - 2:00 pm Project Presentations		10 min each team
FINAL	May 9	FINAL EXAM 2:00-4:30 pm Rm GS 233		

¹ Stewart, R., Introduction to Physical Oceanography, provided via Blackboard

Attendance: At The University of Texas at Arlington, taking attendance is not required but attendance is a critical indicator in student success. However, while UT Arlington does not require instructors to take attendance in their courses, the U.S. Department of Education requires that the University have a mechanism in place to mark when Federal Student Aid recipients “begin attendance in a course.” UT Arlington instructors will report when students begin attendance in a course as part of the final grading process. Specifically, when assigning a student a grade of F, faculty report the last date a student attended their class based on evidence such as a test, participation in a class project or presentation, or an engagement online via Blackboard. This date is reported to the Department of Education for federal financial aid recipients.

Grading: Lecture grade: 75% of total course; Lab grade: 25% of total course

Lab grade:	25% of total course grade
Lecture grade:	75% of total course grade
Lecture grade:	
Online quizzes	4 % of course
In class quizzes (best 2 of 4)	6% of course (3% each)
Exams(2)	30% of course (15% each)
Project (1)	15% of course
Final exam	20% of course

Final grade calculation:

$0.25 \times \text{lab} + 0.10 \times \text{quizzes} + 0.20 \times \text{exams} + 0.15 \times \text{project} + 0.20 \times \text{final exam}$

Score will be translated into a grade based on class average. Maximum score in each category is 100%.

Grades will not be released over the phone or by email. Grades must be either obtained in person or from the UTA online database. Students are expected to keep track of their performance throughout the semester and seek guidance from available sources (including the instructor) if their performance drops below satisfactory levels; see also “Student Support Services,” below.

Exams:

Exams will be problem exercises and multiple-choice questions.

Exams must be taken at the scheduled time.

Make-up exams:

Make-up exams can be only taken in cases of illness or family emergency. A written excuse note from doctor or official may be required in these cases. Students who do not take an exam receive zero points as a grade on that exam. Make-up exams are scheduled and set by the instructor.

Quizzes:

Lecture quizzes are not announced. The 3 best quizzes will be counted towards the total grade. There are no make-up quizzes. Lecture Tool quizzes are taken on-line in class.

Field trip:

Is strongly recommended (corresponding to one lab extra credit) in order to write the project paper.

Project paper:

A signature research assignment in the area of oceanography is designed to stimulate critical thinking skills, teamwork skills, communication skills, and empirical and quantitative skills. Physical and biogeochemical measurements (e.g. temperature, salinity, oxygen, nutrients) from the lake fieldtrip will be analyzed as part of the project. Total report length for each team will be max. 5 pages of text including references. Figures and table shall be attached to the report. The format of the text shall be in letter size, single-spaced, 12 pt times new roman font. Each team will present the project in a 10-minute presentation (including discussion). The project paper has to be written in a scientific style.

Format of paper submission: Only pdf via submission to blackboard

Identical copy of text for the term paper from web or other sources (plagiarized papers or web pages) will result in an F.

Teamwork:

Teamwork is encouraged to stimulate scientific discussion in lecture and lab. Teamwork is allowed in the lab and project with **maximum team size is three students**. In oral presentations, **each** team member needs to present the material. It is the student's responsibility to form a team and coordinate with other team members.

Required Readings:

Readings listed on the syllabus should be completed before the lecture. The lectures will be designed with the assumption that you have a basic understanding of the assigned material.

Academic Integrity:

Academic dishonesty (such as cheating, plagiarism, taking an exam for another person, etc.) will not be tolerated in any form and will be disciplined in accordance with University regulations and procedures.

Blackboard Info: <http://www.uta.edu/blackboard/students/index.html>

Expectations for Out-of-Class Study:

A general rule of thumb is this: for every credit hour earned, a student should spend 3 hours per week working outside of class. Hence, a 3-credit course might have a minimum expectation of 9 hours of reading, study, homework, etc.

Grade Grievances:

Any appeal of a grade in this course must follow the procedures and deadlines for grade-related grievances as published in the current University Catalog:

<http://catalog.uta.edu/academicregulations/grades/#undergraduatetext>

for graduate courses, see

<http://catalog.uta.edu/academicregulations/grades/#graduatetext>.

Drop Policy: Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance.** Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (<http://www.uta.edu/aao/fao/>).

Disability Accommodations:

UT Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including *The Americans with Disabilities Act (ADA)*, *The Americans with Disabilities Amendments Act (ADAAA)*, and *Section 504 of the Rehabilitation Act*. All instructors at UT Arlington are required by law to provide “reasonable accommodations” to students with disabilities, so as not to discriminate on the basis of disability. Students are responsible for providing the instructor with official notification in the form of **a letter certified** by the Office for Students with Disabilities (OSD). Only those students who have officially documented a need for an accommodation will have their request honored. Students experiencing a range of conditions (Physical, Learning, Chronic Health, Mental Health, and Sensory) that may cause diminished academic performance or other barriers to learning may seek services and/or accommodations by contacting:

The Office for Students with Disabilities, (OSD) www.uta.edu/disability or calling 817-272-3364. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability.

Counseling and Psychological Services, (CAPS) www.uta.edu/caps/ or calling 817-272-3671 is also available to all students to help increase their understanding of personal issues, address mental and behavioral health problems and make positive changes in their lives.

Non-Discrimination Policy:

The University of Texas at Arlington does not discriminate on the basis of race, color, national origin, religion, age, gender, sexual orientation, disabilities, genetic information, and/or veteran status in its educational programs or activities it operates. For more information, visit uta.edu/eos.

Title IX Policy:

The University of Texas at Arlington (“University”) is committed to maintaining a learning and working environment that is free from discrimination based on sex in accordance with Title IX of the Higher Education Amendments of 1972 (Title IX), which prohibits discrimination on the basis of sex in educational programs or activities; Title VII of the Civil Rights Act of 1964 (Title VII), which prohibits sex discrimination in employment; and the Campus Sexual Violence Elimination Act (SaVE Act). Sexual misconduct is a form of sex discrimination and will not be tolerated. *For information regarding Title IX, visit www.uta.edu/titleIX or contact Ms. Jean Hood, Vice President and Title IX Coordinator at (817) 272-7091 or jmhood@uta.edu.*

Academic Integrity:

Students enrolled all UT Arlington courses are expected to adhere to the UT Arlington Honor Code:

I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.

I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.

UT Arlington faculty members may employ the Honor Code in their courses by having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System *Regents' Rule* 50101, §2.2, suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University. Additional information is available at <https://www.uta.edu/conduct/>.

Lab Safety Training:

[Students registered for this course must complete all required lab safety training prior to entering the lab and undertaking any activities.](#) Once completed, Lab Safety Training is valid for the remainder of the same academic year (i.e., Fall through Summer II) and must be completed anew in subsequent years. There are no exceptions to this University policy. Failure to complete the required training will preclude participation in any lab activities, including those for which a grade is assigned.

Electronic Communication:

UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at <http://www.uta.edu/oit/cs/email/mavmail.php>.

Campus Carry:

Effective August 1, 2016, the Campus Carry law (Senate Bill 11) allows those licensed individuals to carry a concealed handgun in buildings on public university campuses, except in locations the University establishes as prohibited. Under the new law, openly carrying handguns is not allowed on college campuses. For more information, visit <http://www.uta.edu/news/info/campus-carry/>

Student Feedback Survey:

At the end of each term, students enrolled in face-to-face and online classes categorized as "lecture," "seminar," or "laboratory" are directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be

sent directly to each student through MavMail approximately 10 days before the end of the term. Each student's feedback via the SFS database is aggregated with that of other students enrolled in the course. Students' anonymity will be protected to the extent that the law allows. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law and aggregate results are posted online. Data from SFS is also used for faculty and program evaluations. For more information, visit <http://www.uta.edu/sfs>.

Final Review Week:

The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week *unless specified in the class syllabus*. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

Emergency Exit Procedures:

Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit by following the exit signs. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities.

Students should also be encouraged to subscribe to the MavAlert system that will send information in case of an emergency to their cell phones or email accounts. Anyone can subscribe at <https://mavalert.uta.edu/> or <https://mavalert.uta.edu/register.php>

Student Support Services:

UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include [tutoring](#), [major-based learning centers](#), [developmental education](#), [advising and mentoring](#), personal counseling, and [federally funded programs](#). For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at <http://www.uta.edu/universitycollege/resources/index.php>.

The IDEAS Center (2nd Floor of Central Library) offers **free** tutoring to all students with a focus on transfer students, sophomores, veterans and others undergoing a transition to UT Arlington. To schedule an appointment with a peer tutor or mentor email IDEAS@uta.edu or call (817) 272-6593.

The English Writing Center (411LIBR):

The Writing Center Offers free tutoring in 20-, 40-, or 60-minute face-to-face and online sessions to all UTA students on any phase of their UTA coursework. Our hours are 9 am to 8 pm Mon.-Thurs., 9 am-3 pm Fri. and Noon-6 pm Sat. and Sun. Register and make appointments online at <http://uta.mywconline.com>. Classroom Visits, workshops, and

specialized services for graduate students are also available. Please see www.uta.edu/owl for detailed information on all our programs and services.

The Library's 2nd floor Academic Plaza offers students a central hub of support services, including IDEAS Center, University Advising Services, Transfer UTA and various college/school advising hours. Services are available during the library's hours of operation. <http://library.uta.edu/academic-plaza>

<p>Emergency Phone Numbers: In case of an on-campus emergency, call the UT Arlington Police Department at 817-272-3003 (non-campus phone), 2-3003 (campus phone). You may also dial 911. Non-emergency number 817-272-3381</p>

Library Home Page library.uta.edu

Librarian to Contact: Andy Herzog,

Ph.: 817-272-7517, Email: amherzog@uta.edu, Office: Central Library, 516B

Resources for Students

Academic Help

Academic Plaza Consultation Services library.uta.edu/academic-plaza

Ask Us ask.uta.edu/

Library Tutorials library.uta.edu/how-to

Subject and Course Research Guides libguides.uta.edu

Subject Librarians library.uta.edu/subject-librarians

Resources

A to Z List of Library Databases libguides.uta.edu/az.php

Course Reserves pulse.uta.edu/vwebv/enterCourseReserve.do

FabLab fablab.uta.edu/

Special Collections library.uta.edu/special-collections

Study Room Reservations openroom.uta.edu/

Teaching & Learning Services for Faculty

Copyright Consultation library-sc@listserv.uta.edu

Course Research Guide Development, Andy Herzog amherzog@uta.edu or your subject librarian

Data Visualization Instruction, Peace Ossom-Williamson peace@uta.edu

Digital Humanities Instruction, Rafia Mirza rafia@uta.edu

Graduate Student Research Skills Instruction, Andy Herzog amherzog@uta.edu or your subject librarian

Project or Problem-Based Instruction, Gretchen Trkay gtrkay@uta.edu

Undergraduate Research Skills Instruction, Gretchen Trkay gtrkay@uta.edu or your subject librarian.