

Air-Sea Interaction – Fall 2022

OCG693 - 0002 Special Studies (3 credits)

Tues and Thurs, 12:30-1:45

Watkins 12, Bay Campus

- 1. Instructor:** Dr. Tetsu Hara, Professor of GSO
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Web: <https://web.uri.edu/gso/research/air-sea-interaction-research-group/>
Office Hours: Immediately following lectures or by appointment
- 2. Prerequisite:** No formal requirement
Knowledge of basic fluid dynamics is expected
- 3. Handouts:** Lecture notes will be available online ahead of each lecture

4. Course Description

This course is designed to provide a student with basic physical understanding of air-sea interaction processes, including air-sea fluxes, near surface atmospheric turbulence, upper ocean turbulence and mixing, interaction between near surface turbulence and surface waves.

5. Grading:

The grading will be administered as follows:

Homework sets	30%
Mid-term examination	40%
Final project	30%
TOTAL	100%

Homework sets will be due 1 week from the date assigned. These will be open book exercises designed to sharpen your skills as well as to cover material that we could not cover in detail in class. Each homework set includes 2 or 3 questions.

The mid-term exam will be take home (3 days). This is designed to test your creativity in problem solving and how well you have synthesized the material.

The final project (term paper) is designed to provide a student with an opportunity to acquire in-depth knowledge of a chosen subject related to air-sea interaction. A student will choose a topic related to this course, study relevant scientific literature, summarize what he/she has learned, make a short presentation (10-15 min) during the last class, and submit a written term paper (7-10 pages in a pdf format) by the due date.

6. Course Calendar (tentative!):

- 9/8 Introduction
9/13 Basic fluid dynamics
9/15 Turbulence (1)
9/20 Turbulence (2)
9/22 Turbulence (3)
9/27 Wind waves (1)
Homework Set 1 due
9/29 Wind waves (2)
10/4 Atmospheric surface layer turbulence and air-sea momentum/heat flux (1)
10/6 Atmospheric surface layer turbulence and air-sea momentum/heat flux (2)
10/11 Atmospheric surface layer turbulence and air-sea momentum/heat flux (3)
10/13 Atmospheric surface layer turbulence and air-sea momentum/heat flux (4)
Homework Set 2 due
10/18 Atmospheric surface layer turbulence and air-sea momentum/heat flux (5)
10/20 Upper ocean currents and turbulence, ocean mixed layer models (1)
10/25 Upper ocean currents and turbulence, ocean mixed layer models (2)
10/27 Upper ocean currents and turbulence, ocean mixed layer models (3)
Homework Set 3 due
11/1 Upper ocean currents and turbulence, ocean mixed layer models (4)
11/3 Upper ocean currents and turbulence, ocean mixed layer models (5)
Mid-term take home examination between 11/3 and 11/10
11/10 Bubbles and seaspray (1)
11/15 Bubbles and seaspray (2)
11/17 Air-sea gas flux (1)
11/22 NO CLASS
11/29 Air-sea gas flux (2)
12/1 Air-sea gas flux (3)
Homework Set 4 due
12/6 Ocean surface films (1)
12/8 Ocean surface films (2)
12/13 **Final project presentations**

12/20 **Term paper due**

7. Supplementary texts:

Atmosphere-Ocean Interaction, Second Edition
E.B. Kraus and J.A. Businger
Oxford University Press, 1994