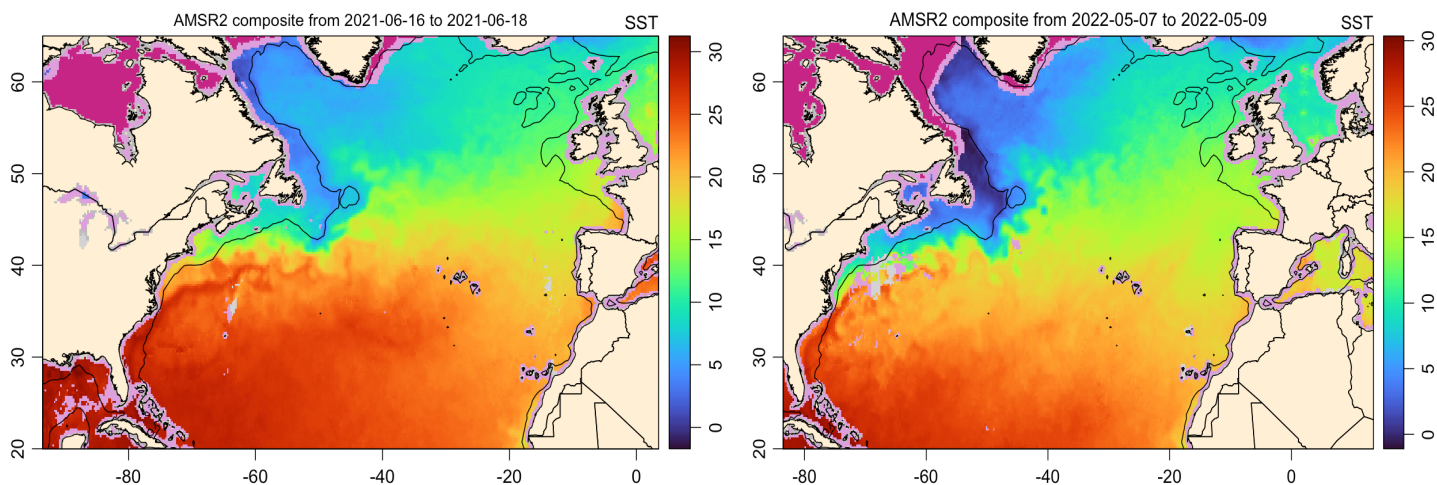


**Faculty of Science Course Syllabus Fall 2022 (revised June 2021 and Aug 2021)****Department of Oceanography****OCEA 4120 and 5120****Physical Oceanography****Autumn 2022****Instructor(s):** Dan Kelley [dan.kelley@dal.ca](mailto:dan.kelley@dal.ca)**Lectures:** Mon-Wed-Fri 1035-1125**Laboratories:** NA**Tutorials:** NA**Course delivery:** In-person, at least at the start of term, covid-19 permitting**Course Description**

This course, cross-listed at undergraduate and postgraduate levels, introduces students to the physical properties and dynamics of the oceans. Topics range from global circulation down to the small scales of turbulence. Fact and theory are blended throughout the lectures. Insight is a key goal. Quantitative problem solving is emphasized in assignments.

**Course Prerequisites**

MATH 1000.03, 1010.03, classic calculus or equivalent, and permission of the instructor.

**Course Exclusion**

Students must not be enrolled in any other class that has overlapping lecture times.

**Learning Objectives**

Students should be able to describe the basic patterns of ocean properties (e.g. as illustrated above) and flow, to contextualize them in terms of physical laws, and to address research-level applications to e.g. the atmosphere-ocean system and the biology and chemistry of the seas.

**Course Materials**

Instructor-written study notes (300+ page PDF file) and other materials will be provided on the course webpage. Software may be provided on other, more powerful, webpages.

**Course Assessment**

The assessment will involve 2 assignments, a mid-term test, and a final examination. That's if covid-19 does not interrupt things, forcing a switch to more assignments.

**Other course requirements**

Since this is a lecture-based course, skipping classes is highly discouraged.

**Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale**

A+ (90-100)	B+ (77-79)	C+ (65-69)	D	(50-54)
A (85-89)	B (73-76)	C (60-64)	F	(<50)
A- (80-84)	B- (70-72)	C- (55-59)		

**Course Policies**

A late fee of 15% per working day (defined by hours of service in the departmental office, prorated by hour) is applied to assignments, unless a "time out" period is justified using a Student Declaration of Absence form or by other suitable means. Assignments are intended to encourage and display the understanding of individuals, *not* of groups. Students registered in the 5120 stream will be held to a higher standard than those registered in the 4120 stream, and they will also have a higher workload, as appropriate.

**Course Content**

Introduction; concepts of fluid mechanics; building (and breaking) intuition; ocean measurement technology; hydrography of the sea; watermasses; momentum and mass-conservation equations; Reynolds decomposition; air-sea fluxes; 0D and 1D models of response to wind; geostrophy; potential vorticity; Rossby waves; wind-driven basin-scale circulation; global-scale thermohaline circulation; mixing; estuaries; shelf circulation; gravity waves; tides; numerical modelling; data assimilation.