

OCEA 5380/4380 – Marine Modeling Winter 2015

Instructor:

Mathieu Dever

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Office hours: By appointment

Lecture and lab materials are provided by Prof. Katja Fennel

Course Times:

- Lectures: Mondays and Wednesdays, 13:35 – 14:25
- Labs: Fridays, 13:35 – 14:25

Location:

- Lectures: LSC Oceanography, room #3655
- Labs: Computer Sciences Building, PC lab #1

Course Objectives: This course is designed to introduce a variety of modeling techniques useful in oceanography and the natural sciences in general. The main objective is to provide an overview of a range of techniques, rather than exhaustive and in depth discussion of any particular technique. The approach is to introduce techniques, discuss their assumptions and limitations, and apply them to simple problems in oceanography and earth sciences. This is accomplished by a combination of lectures and labs. At the end of this course, students should have an understanding of various modeling approaches and their applicability; as a result, they will be better placed to both carry out their own research, and to critically evaluate the literature.

Approach: A series of more or less independent modules will be presented, each of which will include an introduction to a particular technique, some examples, and an assignment in which the student will have the opportunity to apply the techniques to simple problems.

Course Assessment: Grades will be determined based on the Faculty of Science Grading Scale applied to the cumulative score on the following assessment components:

Two homework assignments (each 15%): Submission by e-mail is encouraged. All files used for calculations (*e.g.* Matlab scripts) are to be included as an appendix so that your procedures can be checked, but your answers in each assignment must be complete on their own. You may discuss with others during the preparation of your assignment, but the work must be yours.

Regular quizzes (20%): Quizzes will be announced in the lecture prior to each quiz and will cover material from the preceding set of lectures only.

A term project (40%): The project will be presented orally and in written form and will include a critical analysis of one or two modeling techniques from the literature.

Class participation (10%): You are expected to attend classes and labs. Questions are encouraged and in fact expected. For your benefit, and that of your classmates, please interrupt when you have comments to offer or do not understand any part of the presentation.

Expectations will differ between graduate and undergraduate students as indicated on homework assignments and quizzes.

Late Penalties: Deadlines will be specified for all assignments. Late submissions will not be accepted.

Logistics: Access to MATLAB on your own computer will be crucial. The oceanography department is prepared to provide you with a temporary license if you do not have access already.

Course Website: Lecture materials will be posted on the course website <http://memg.ocean.dal.ca/dever/MM2015> (login: MMstudent, password: oceans14). The Blackboard Learning System will be used for dissemination of assessments and grades.

Recommended Readings: Modeling Methods for Marine Science, D.M. Glover, W.J. Jenkins & S.C. Doney, Cambridge University Press, 2011.

Schedule: The attached schedule outlines the material that will be presented in the course. The schedule is subject to change, because the emphasis will be on developing an understanding of a range of techniques rather than on covering all topics or adhering to a rigid schedule.

U1 (1)	Introduction
U2 (2)	Measurement Theory and Errors
U3 (1)	Probability
U4 (1)	Error Analysis
U5 (1)	Linear Algebra Refresher
U6 (2)	Population Dynamics
U7 (3)	Dimensional Analysis
U8 (3)	Discriminant Analysis, Principal Component Analysis, EOF Analysis
U9 (2)	Least Squares Regression
U10 (2)	Time Series Analysis
U11 (2)	Numerical Techniques

Cancellation of lectures: If a lecture has to be cancelled for reasons other than campus closure, you will be informed by e-mail no later than 1 pm on the day of the lecture.

Accommodation of disabilities: Dalhousie University has a policy of accommodation of disabilities, including functional limitation caused by a long term or recurring physical, sensory, mental, psychiatric or learning impairment that restricts the ability of a person to perform the daily activities necessary to participate in learning or daily living at Dalhousie University. The Department of Oceanography is committed to this policy. It is the students responsibility to make a request for accommodation in accordance with this policy. The request for accommodation must be made reasonably in advance of the event or process in relation to which accommodation is being sought so that a decision can be made. Except in rare circumstances when significant psychological or mental health issues arise, there should be no after-the-fact accommodation. The University will consider a request for accommodation made by a third party (physician, family member, caregiver, advocate or other representative) only where the student has provided prior written consent.

Faculty of Science 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)		