Texas A&M University
Departmental Request for a New Course
Undergraduate • Graduate • Professional
• Submit original form and attach a course syllabus.

1. This request is submitted by the Department of
Oceanography

2. Course prefix, number and complete title of course:
OCNG 678 Coastal Dynamics

3. Catalog course description (not to exceed 50 words):
Surveys dynamical processes that determine estuarine and continental shelf circulation; geophysical scale flow where Earth’s rotation and buoyancy effects are important; analytical and numerical methods used to isolate and study these processes.

4. Prerequisite(s):
OCNG 609 Physical Oceanography

Cross-listed with:

Cross-listed courses require the signature of both department heads.

5. Is this a variable credit course? □ Yes ☒ No If yes, from ______ to ______

6. Is this a repeatable course? □ Yes ☒ No If yes, this course may be taken ______ times.

Will this course be repeated within the same semester? □ Yes ☒ No

7. This course will be:
   a. required for students enrolled in the following degree program(s) (e.g., B.A. in history)
      NA
   b. an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)
      MS. PH.D. Oceanography;

8. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. Attach approval letters.

9. Prefix Course # Title (excluding punctuation)

   OC NG 6 7 8 CO AS TAL DY NA M I C S

   Lect. Lab SCH CIP and Fund Code Admin. Unit Acad. Year FICE Code
   0 3 0 0 3 4 0 6 0 7 0 2 1 4 0 1 0 - 1 1 0 3 6 3 2

Approval recommended by:
Piers Chapman, Ph.D.
Department Head - Type Name & Sign Date 9/10/09

Chair, College Review Committee Date 9/10/09

Dean of College Date 9/10/09

Department Head - Type Name & Sign (if cross-listed course) Date

Dean of College Date

Submitted to Coordinating Board by:
Associate Director, Curricular Services Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra.williams@tamu.edu
Curricular Services – 3/09

Corrected 9/1/09
Texas A&M University
Departmental Request for a New Course
Undergraduate • Graduate • Professional
Submit original form and attach a course syllabus.

1. This request is submitted by the Department of Oceanography.
2. Course prefix, number and complete title of course: OCNG 678 Coastal Dynamics
3. Catalog course description (not to exceed 50 words): Coastal Dynamics surveys dynamical processes that determine estuarine and continental shelf circulation. The primary focus is on geophysical scale flow where the earth’s rotation and buoyancy effects are important. Analytical and numerical methods are used to isolate and study these processes.

4. Prerequisite(s): OCNG 690
   Cross-listed with:
   Cross-listed courses require the signatures of both department heads.

5. Is this a variable credit course? ☐ Yes ☒ No If yes, from _____ to _____
6. Is this a repeatable course? ☐ Yes ☒ No If yes, this course may be taken _____ times.
   Will this course be repeated within the same semester? ☐ Yes ☒ No

7. This course will be:
   a. required for students enrolled in the following degree program(s) (e.g., B.A. in history) NA
   b. an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography) MS. PH.D. Oceanography;

8. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. Attach approval letters.

9. Prefix Course # Title (excluding punctuation)

<table>
<thead>
<tr>
<th>Lec.</th>
<th>Lab</th>
<th>SCH</th>
<th>CLP</th>
<th>Fund Code</th>
<th>Admin.</th>
<th>Unit</th>
<th>Acad. Year</th>
<th>HIC Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>4</td>
<td>6</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Approval recommended by:

Piers Chapman, Ph.D.
Department Head - Type Name & Sign Date 7/10/09

Chair, College Review/Committee Date 7/13/09

Dean of College Date 7/13/09

Dean of College Date 9/13/09

Submitted to Coordinating Board by:

Associate Director, Curricular Services Date

Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 3/09
Course title and number: OCNG 678 Coastal Dynamics
Term (e.g., Fall 200X): Fall 2009
Meeting times and location: O&M

Course Description and Prerequisites
Coastal Dynamics surveys dynamical processes that determine estuarine and continental shelf circulation. The primary focus is on geophysical scale flow where the earth's rotation and buoyancy effects are important. Analytical and numerical methods are used to isolate and study these processes.

Prerequisites:
OCNG 609

Learning Outcomes or Course Objectives

1. The student will describe the fundamental physical processes acting in coastal and estuarine flow.

2. Students will derive classic analytical theories that describe estuarine and shelf circulation.

3. Students will describe the numerical methods used to investigate these phenomena, and evaluate the strengths and weaknesses of various numerical approaches.

4. Students will summarize current research in a particular area of estuarine and coastal ocean circulation through both an oral presentation and a written paper.

Instructor Information
Name: Robert Hetland
Telephone number: 979-458-0096
Email address: hetland@tamu.edu
Office hours: Tuesdays: 10 a.m.-12p.m.; Wednesdays: 1-3 p.m.
Office location: O&M Building; 618D

Textbook and/or Resource Material
There is no single adequate textbook for this topic, so we will read and discuss one or two seminal scientific papers on each of the various subjects, supplemented with textbook chapters and other reading. A list of relevant textbooks is:

Grading Policies

Homework will be assigned approximately every other week, and will account for 40% of your grade. Students will be expected to contribute to, and occasionally lead the discussion of the topic paper. Contribution to the discussion will be based on questions submitted at the start of class and participation in the discussion based on these questions. Class participation will account for 30% of your grade. A research project, either a small original project or an in-depth review of established work, with a typed report and oral presentation will account for the remaining 40%of your grade. The grading scale is 90-100% = A, 80-89% = B, 70-79% = C, 60-69 = D, 59 and below = F.

Course Topics, Calendar of Activities, Major Assignment Dates

Barotropic flow:

Week 3: Shelf waves – Strum-Liuville theory to determine cross-shelf structure of cross-shore modes.

Week 4: Slowly evolving frictional flow – the arrested topographic wave.

Baroclinic flow:
Week 5: Review of the effects of stratification – the reduced gravity model.

Week 6: The Rossby adjustment problem in the presence of a coast.

Week 7: Coastal upwelling – Ekman dynamics.

**Week 8**: Stratified continental shelf waves – the slope Burger number.

**Week 9**: Shelf break processes – Frontal trapping depth.

**Week 10**: River plumes – Reduced gravity plumes.


**Week 11**: Estuaries – Knudsen’s relation, the effects of fresh water discharge and tidal mixing.


**Week 12**: Hydraulic control – two-layer flow through a constriction.

*Turbulent mixing:*

**Week 13**: Mixed layer models and second moment closure.

**Americans with Disabilities Act (ADA)**
The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit [http://disability.tamu.edu](http://disability.tamu.edu)

**Academic Integrity**
For additional information please visit: [http://www.tamu.edu/aggiehonor](http://www.tamu.edu/aggiehonor)

"An Aggie does not lie, cheat, or steal, or tolerate those who do."