Texas A&M University

Departmental Request for a Change in Course

Undergraduate • Graduate • Professional

Submit original form and attachments

1. This request is submitted by the Department of Civil Engineering

2. Course prefix, number and complete title of course: OCEN 683 Estuary Hydrodynamics

3. Change requested
   a. Prerequisite(s): From: Basic fluid mechanics; approval of instructor To: OCEN 678 or approval of instructor
   b. Withdrawal (reason):
   c. Cross-list with: Cross-listed courses require the signature of both department heads.
   d. Change in course title and description. Enter complete current course title and current course description in item 4; enter proposed course title and proposed course description in item 5.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 6. Attach a course syllabus.

4. Complete current course title and current course description:

5. Complete proposed course title and proposed course description (not to exceed 50 words):

6. a. As currently in course inventory:

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<th>Title (excluding punctuation)</th>
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<td>683</td>
<td>ESTUARY HYDRODYNAMICS</td>
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b. Change to:

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Approval recommended by:

[Signature] 12/15/08

Head of Department Date

Head of Department (if cross-listed course) Date

Submitted to Coordinating Board by:

[Signature] Date

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 – 10/08
Supporting statements for requested prerequisite changes:

OCEN 671: Listed prerequisite of OCEN 462 is a mistake; actual prerequisite is our undergraduate fluid mechanics course - CVEN 311.

OCEN 678: Listed prerequisite of CVEN 462 does not exist; actual prerequisite is our undergraduate fluid mechanics course - CVEN 311.

OCEN 682: Faculty feel material covered in OCEN 671 is required for proper understanding of material in this course. We want to make this information clear to the students, rather than simply requiring approval of instructor.

OCEN 683: Faculty feel material covered in OCEN 678 is required for proper understanding of material in this course. We want to make this information clear to the students, rather than simply requiring approval of instructor.
Course title and number  OCEN683 Estuarine Hydrodynamics
Term (e.g., Fall 200X)  Fall 2008
Meeting times and location  11:10 – 12:25 Tuesdays & Thursdays, CE Room 221

Course Description and Prerequisites
Estuary dynamics, mixing and transport, tidal inlet dynamics, vegetated flows, long-wave modeling.
Prerequisites: Basic fluid dynamics, instructor approval.

(To be changed to OCEN678 or instructor approval)

Learning Outcomes or Course Objectives
See last pages (combined with calendar of activities and course topics)

Instructor Information
Name  Jennifer L. Irish, Ph.D., P.E.
Telephone number  979-845-4586
Email address  jirish@civil.tamu.edu
Office hours  Tuesdays 2-4 and Thursdays 9-10
Office location  CE/TTI Room 801A

Textbook and/or Resource Material
Hydrodynamics and transport for water quality modeling (Martin and McCucheon) plus other assigned reading.
See course website for reading assignments.

Grading Policies
Homework (25%)
Class participation (10%)
Midterm Exam/Project (30%)
Final Exam/Project (35%)

Class attendance is required. Grading of class participation will be based primarily on individual participation in in-class discussions and question sessions following individual exam project presentations.

A request for regrading homework assignment or exam/project must be made within one week after the homework assignment or exam/project is returned.

Final grade assignments will be as follows: A = 90 and above = A; B = 80 – 89; C = 70 – 79; D = 60 – 69, F = below 60.

Course Topics, Calendar of Activities, Major Assignment Dates
See last pages (combined with learning objectives)

Other Pertinent Course Information
Course website: http://ceprofs.civil.tamu.edu/jirish/ocen683
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

Academic Integrity

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

For additional information please visit: http://www.tamu.edu/aggiehonor

Students are expected to understand and abide by the Aggie Honor Code presented on the web at: http://www.tamu.edu/aggiehonor. No form of scholastic misconduct will be tolerated. Academic misconduct includes cheating, fabrication, falsification, multiple submissions, plagiarism, complicity, etc. These are more fully defined in the above web site. Violations will be handled in accordance with the Aggie Honor System Process described on the web site.

The handouts used in this course are copyrighted. By “handouts,” I mean all materials generated for this class, which include but are not limited to syllabi, notes, quizzes, exams, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts unless I expressly grant permission.

Cheating on homework, exams, and projects will not be tolerated. Cheating will be reported and handled in accordance with the Aggie Honor System Process. If an examination is closed book; “looking at another student's examination or using external aids (for example, books, notes, calculators, conversation with others, or electronic devices)” during these examinations is a violation of Texas A&M Aggie Honor Code, Cheating, unless specifically allowed in advance by the instructor.

Unless specifically allowed in advance by the instructor, all homework assignments, exams, and course projects in this class are expected to be completed based on individual effort. Copying the work of others, including homework, is a violation of Texas A&M Aggie Honor Code, Cheating.
Course Outline and Learning Objectives (see course website for required reading)

August 26: Flow and transport fundamentals
1. Define estuary
2. Explain estuary classifications
3. Distinguish between intrinsic and extrinsic properties
4. Determine total density

August 28: Flow and transport fundamentals
1. Determine diffusion
2. Derive conservation equations
3. Derive water & constituent mass conservation
4. Derive momentum equation

September 2 & 4: CLASS WILL NOT MEET

September 9: Flow and transport fundamentals
1. Describe Reynolds decomposition
2. Derive Reynolds equations

September 11: Astronomical tides
1. Describe astronomical tides
2. Derive lunar tide producing force
3. Determine tidal harmonics

September 16: Astronomical tides & Estuary tidal dynamics
1. Determine tidal datums
2. Derive shallow-water equations for tidal hydrodynamics

September 18: Estuary tidal dynamics
1. Derive shallow-water equations with frictional resistance
2. Describe Coriolis effect

September 23: Estuary tidal dynamics
1. Determine fresh-water flushing time
2. Describe wind-induced estuary circulation and setup
3. Describe wave-induced circulation and setup
4. Determine eddy viscosity by turbulence closure
5. Derive kinetic energy advection-diffusion equation
6. Derive dissipation advection-diffusion equation

September 25: Estuary tidal dynamics. mixing, and transport
1. Derive dissipation advection-diffusion equation
2. Determine eddy diffusivity by turbulence closure
3. Decompose flow properties by large-scale decomposition
4. Describe dispersion

September 30: Estuary mixing and transport
1. Describe dispersion
2. Derive analytical solution for pollutant dispersion

October 2: Estuary mixing and transport/ Hydrodynamic models
1. Determine appropriate model scales
2. Derive constituent transport for 0-dimensional models
3. Quantify salt wedge formation
4. Derive 2D vertical model based on salinity distribution

October 7: Hydrodynamic models/Vegetated hydrodynamics
1. Determine flow and constituent transport using 2D depth-integrated dynamic model
2. Describe vegetated hydrodynamics
October 9: Vegetated hydrodynamics
   1. Distinguish between vegetated flow regimes
   2. Derive momentum balance in vegetated flows
October 14: Vegetated hydrodynamics
   1. Describe volume-averaged drag in vegetated flows
   2. Describe flow in submerged canopies
October 16: Vegetated hydrodynamics
   1. Describe flow in submerged canopies
   2. Derive turbulent kinetic energy budget for emergent canopies
   3. Describe turbulent diffusion in emergent canopies
   4. Describe mechanical dispersion in emergent canopies
October 21: Vegetated hydrodynamics
   1. Describe mechanical dispersion in emergent canopies
   2. Describe longitudinal dispersion in emergent canopies
October 23: Vegetated wave dynamics
   1. Derive linearized wave energy loss in emergent canopies
   2. Derive linearized wave setup damping by emergent canopies

October 28: CLASS WILL NOT MEET
October 30: Vegetated wave dynamics
   1. Derive wave damping in submerged canopies by linearized conservation of momentum

November 4: MIDTERM PROJECT ORAL PRESENTATIONS
November 6: Vegetated wave dynamics & Tidal inlet hydrodynamics
   1. Describe damping and drag in submerged canopies
   2. Derive mass conservation through tidal inlets
November 11: Tidal inlet hydrodynamics
   1. Derive momentum conservation through tidal inlets
   2. Derive Keulegan K (repletion coefficient)
   3. Classify inlets by Keulegan K
   4. Derive tidal prism
November 13: Tidal inlet hydrodynamics
   1. Determine tidal inlet stability
   2. Describe influence of freshwater input on tidal amplitude
   3. Derive bay superelevation
   4. Describe tidal inlet morphology
November 18: Tidal inlet hydrodynamics
   1. Describe tidal inlet morphology
   2. Describe ebb shoal equilibrium
   3. Explain hydrodynamics for multiple-inlet and bay systems

November 20: CLASS WILL NOT MEET
November 25: Tidal inlet hydrodynamics
   1. Determine governing flow regime for mixing and dispersion at inlets
November 27 - Thanksgiving holiday

December 2 - FINAL PROJECT ORAL PRESENTATIONS