7. Texas A&M University at Galveston

New Course

**MARS 408. Estuarine and Coastal Hydrodynamics. (3-0). Credit 3.** Physical processes in estuarine and coastal environments in various time scales: turbulent, tidal and residual (subtidal); study of salts, suspended solids, nutrients and heat affected by water movement; physical, biogeochemical processes and mass transport. Prerequisites: MATH 251, PHYS 218, junior or senior classification or approval of instructor.
TEXAS A&M UNIVERSITY
AT GALVESTON
TAMUG
NEW COURSE
Texas A&M University
Departmental Request for a New Course
Undergraduate • Graduate • Professional
• Submit original form and attach a course syllabus.

Form Instructions
1. Course request type:
   - Undergraduate □ Graduate □ First Professional □ DDS, MD, JD, PharmD, DVM

2. Request submitted by (Department or Program Name):
   Marine Sciences

3. Course prefix, number and complete title of course:
   MARS 408 Introduction to Estuarine and Coastal Hydrodynamics

4. Catalog course description (not to exceed 50 words):
   Physical processes in estuarine and coastal environments in various time scales:
   turbulent, tidal and residual (subtidal); study of salinity, suspended solids, nutrients, and heat
   affected by water movement; physical, biogeochemical processes and mass transport.

5. Prerequisite(s):
   MATH 251, PHYS 218, Jr or Sr classification or approval of instructor

6. Cross-listed with:

7. Stacked with:

8. Is this a variable credit course? □ Yes □ No
   If yes, from _______ to _______

9. Is this a repeatable course? □ Yes □ No
   If yes, this course may be taken _______ times.

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

11. Will this course be submitted to the Core Curriculum Council? □ Yes □ No

12. How will this course be graded?: □ Grade □ S/U □ P/F (CLMD)

13. This course will be:
   a. required for students enrolled in the following degree program(s) (e.g., B.A. in history)

   b. an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)

   Marine Sciences, Offshore and Coastal Systems Engineering

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

15. I verify that I have reviewed the FAQ for Export Control Basics for Distance Education
    (http://vpr.tamu.edu/resources/export-control/export-control-basics-for-distance-education).

16. Prefix: MARS 408
    Title: ESTUARINE & COASTAL HYDRODYNAMICS

17. Lect. Lab. Other SCH CIP and Fund Code Admin. Unit Acad. Year FICE Code
    3.00 0.00 Other 3.00 30.3201.00 02 1810 16 - 17 0 1 0 2 9 8

18. Approval recommended by:
   Kyeong Park
   Department Head or Program Chair (Type Name & Sign) Date

19. Chair, College Review Committee
   Date

20. Chair, College Review Committee
   Date

21. Submitted to Coordinating Board by:
   Chair, GC or UCC
   Date

22. Effective Date

RECEIVED
By Curricular Services at 2:19 pm, Aug 21, 2015

This form should be directed to Sandra Williams at 645-8201 or sandra.williams.tamu.edu.
Curricular Services – 07/14
Course title and number: Estuarine and Coastal Hydrodynamics (MARS 408)
Term: Fall 201X
Meeting times and location: TBD

Course Description and Prerequisites
Materials introduced into estuarine and coastal environments, such as salts, suspended solids, nutrients, and even heat, are affected by water movement (as well as by material-specific biogeochemical processes), thus making physical mass transport a fundamental component in studying fate and distribution of materials in estuarine and coastal environments. This course introduces physical processes occurring in estuarine and coastal environments. With physical processes occurring in various time scales in estuarine and coastal environments, discussion will proceed in terms of three different time scales: turbulent, tidal, and residual (subtidal) time scales. This course will also discuss the effects of physical processes on mass transport and some important biogeochemical processes.
Prerequisites: MATH 251, PHYS 218, junior or senior classification or approval of instructor.

Learning Outcomes
Upon completion of the course, a student is expected to

- explain different time and spatial scales at which physical processes (mainly water movement) occur in estuarine and coastal environments;
- discuss physical processes in tidal and subtidal time scales and their effects on mass (e.g., pollutant) transport;
- discuss roles of turbulence as it affects physical processes in tidal and subtidal time scales (e.g., mean motion); and
- describe processes important for long-term transport and distribution of materials (e.g., pollutants) in estuarine and coastal environments.

Upon completion of the course, a student is expected to be prepared for embarking upon more advanced subjects in the dynamics of marine and coastal sciences and engineering, such as numerical modeling of physical mass transport, biogeochemical pollutants, or living resources.

Instructor Information
Name: Kyeong Park
Telephone number: 409-740-4710
Email address: parkk@tamug.edu
Office hours: TBD
Office location: OCSB 280

Textbook and/or Resource Material
No formal textbook exists but lecture notes will be provided. Recommended auxiliary textbooks are

Course Topics and Calendar of Activities

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>Introduction and definition of terminology</td>
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<tr>
<td>2</td>
<td>Qualitative classification and characterization of estuaries</td>
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<tr>
<td>3</td>
<td>Different components depending on their time scales and the corresponding governing equations and their physical meanings</td>
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<tr>
<td>4</td>
<td>Dimensional and scaling analysis of governing equations for open ocean and coastal systems</td>
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<tr>
<td>5</td>
<td>Tidal dynamics: Tide producing force and generation of tidal waves</td>
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<tr>
<td>6</td>
<td>Tidal dynamics: Tides in open ocean vs. tides in estuarine and coastal environments</td>
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<tr>
<td>7</td>
<td>Tidal dynamics: Linear shallow water wave theory – progressive vs. standing waves</td>
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<tr>
<td>8</td>
<td>Mid-exam, and turbulence: Its effects on ensemble mean motion</td>
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<tr>
<td>9</td>
<td>Turbulence: Parameterization of turbulent mixing and its implications on mean motion</td>
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<tr>
<td>10</td>
<td>Residual circulation: Salt balance in partially-mixed estuaries</td>
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<tr>
<td>11</td>
<td>Residual circulation: Dynamic balance in partially-mixed estuaries</td>
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<tr>
<td>12</td>
<td>Residual circulation: Analytical solution and transient behavior</td>
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<tr>
<td>13</td>
<td>Subtidal mass transport: Theory and application</td>
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<td>14</td>
<td>Tidal flushing, dispersion and distribution of pollutants</td>
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<tr>
<td>15</td>
<td>Final exam</td>
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</table>

: Homework assignments will be given based on the progress of the lectures.

Grading Policies

A total of 100 course points can possibly earned by a undergraduate student. Students will have two in-class exams (with each exam accounting for 42%) and homework problems (16%). The grading scale is A (≥ 80%), B (≥ 70%), C (≥ 60%), and D (≥ 50%).

Statement on Course Evaluations

The PICA (Personalized Instructor/Course Appraisal) is an online course evaluation for Texas A&M. We highly encourage you to complete an evaluation for each course on your schedule. Student input is a critical component used to improve curriculum and teaching. Each faculty member values your input to improve his/her methodology. Your comments can also significantly impact the mix and membership of faculty. The PICA website is available at http://pica.tamu.edu, your Howdy portal, or by scanning:

Americans with Disabilities Act (ADA) Policy Statement

The Americans with Disabilities Act (ADA) is a federal non-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this law 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 the Counseling Office, Seibel Student Center, or call (409) 740-4587. For additional information visit http://www.tamug.edu/counsel/services/dssprocedures.htm.

Academic Integrity Statement and Policy

Aggie Honor Code: “An Aggie does not lie, cheat, or steal, or tolerate those who do.” Upon accepting admission to Texas A&M University at Galveston, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning, and to follow the philosophy and rules of
the Honor System. Students will be required to state their commitment on examinations, research papers, and other academic work. Ignorance of the rules does not exclude any member of the TAMUG community from the requirements or the processes of the TAMUG Honor System. For additional information please visit http://www.tamug.edu/HonorSystem.

**Attendance and Make-up Policies**

Information concerning absences is contained in the University Student Rules Section 7 (http://www.tamug.edu/stulife/Academic%20Rules/Rule%207.pdf). The University views class attendance as an individual student responsibility. All students are expected to attend class and to complete all assignments. Please consult the University Student Rules for reasons for excused absences, detailed procedures and deadlines as well as student grievance procedures (Part III, Section 45).

**Statement on the Family Educational Rights and Privacy Act (FERPA)**

FERPA is a federal law designed to protect the privacy of educational records by limiting access to these records, to establish the right of students to inspect and review their educational records and to provide guidelines for the correction of inaccurate and misleading data through informal and formal hearings. To obtain a listing of directory information or to place a hold on any or all of this information, please consult the Admissions & Records Office. Items that can never be identified as public information are a student's social security number or institutional identification number, citizenship, gender, grades, GPR or class schedule. All efforts will be made in this class to protect your privacy and to ensure confidential treatment of information associated with or generated by your participation in the class.