Course Change Request

New Course Proposal

Date Submitted: 11/15/17 11:25 am

Viewing: **OCEN 311 : Fluid Statics and Dynamics**

Last edit: 02/01/18 1:34 pm

Changes proposed by: r-randall

Programs referencing this course

**BS-OCEN: Ocean Engineering - BS**

Faculty Senate Number

Contact(s)

<table>
<thead>
<tr>
<th>Name</th>
<th>E-mail</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robert Randall</td>
<td><a href="mailto:r-randall@tamu.edu">r-randall@tamu.edu</a></td>
<td>979-845-4568</td>
</tr>
</tbody>
</table>

Course prefix | OCEN          | Course number | 311         |
Department    | Ocean Engineering |
College/School | College of Engineering |
Academic Level | Undergraduate |

Undergraduate course level justification (Select One)

Prerequisites

*All prerequisites will be enforced through COMPASS.*

Academic Level (alternate) | Graduate
Effective term             | 2018-2019

Complete Course Title

Fluid Statics and Dynamics

Abbreviated Course Title

FLUID STATICS AND DYNAMICS

Catalog course description

Fluid properties; statics; kinematics; ideal gas law; potential flow; basic conservation principles of continuity, momentum and energy; Bernoulli equation; similitude and hydraulic models; incompressible flow in pipes; fluid dynamic drag; boundary layer basics.

Prerequisites and Restrictions

Grade of C or better in MATH 251, and OCEN 221 or CVEN 221.

Concurrent Enrollment | No
Should catalog prerequisites / concurrent enrollment be enforced? | Yes

In Workflow
1. OCEN Department Head
2. Curricular Services Review
3. EN Committee Preparer UG
4. EN Committee Chair UG
5. EN College Dean UG
6. UCC Preparer
7. UCC Chair
8. Faculty Senate Preparer
9. Faculty Senate
10. Provost II
11. President
12. Curricular Services
13. Banner

Approval Path
1. 11/15/17 11:30 am
   Robert Randall (r-randall): Approved for OCEN Department Head
2. 11/17/17 8:29 am
   Sandra Williams (sandra-williams): Approved for Curricular Services Review
3. 11/29/17 9:56 am
   Eileen Hoy (ehoy): Approved for EN Committee Preparer UG
4. 11/29/17 11:39 pm
   Prasad Enjeti (enjeti): Approved for EN Committee Chair UG
5. 11/29/17 11:40 pm
   Prasad Enjeti (enjeti): Approved for EN College Dean UG
6. 12/14/17 2:05 pm
   Sandra Williams (sandra-williams): Approved for UCC Preparer
7. 02/05/18 2:16 pm
   Sandra Williams (sandra-williams): Approved for UCC Chair

https://nextcatalog.tamu.edu/courseleaf/approve/
### Enforced Prerequisites / Concurrent Enrollment

<table>
<thead>
<tr>
<th>And/Or</th>
<th>Course Prefix/Number</th>
<th>Min Grade/Score</th>
<th>Academic Level</th>
<th>)</th>
<th>Concurrency?</th>
</tr>
</thead>
<tbody>
<tr>
<td>And</td>
<td>MATH 251</td>
<td>C</td>
<td>UG</td>
<td></td>
<td></td>
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<tr>
<td>Or</td>
<td>OCEN 221</td>
<td>C</td>
<td>UG</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CVEN 221</td>
<td>C</td>
<td>UG</td>
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</tbody>
</table>

Crosslistings: No  Crosslisted With:  
Stacked: No  Stacked with:  

### Semester 3 Credit Hour(s)
- Contact Hour(s) (per week):  
- Lecture: 3  
- Lab: 0  
- Other: 0  
- Total: 3

### Repeatability
- Repeatable for credit? No  
- Three-peat? No  

### Program Information
- CIP/Fund Code: 1424010006  
- Default Grade Mode: Letter Grade(G)  
- Alternate Grade Modes: Satisfactory/Unsatisfactory  
- Method of instruction: Lecture  
- Will sections of this course be taught as non-traditional? (i.e., parts of term, distance education) No

### Course Specific Information
- Will this course be taught as a distance education course? No  
- Is 100% of this course going to be taught in Texas? Yes  
- Will classroom space be needed for this course? Yes

This will be a required course or an elective course for the following programs:

<table>
<thead>
<tr>
<th>Program(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(BS-OCEN) Ocean Engineering - BS</td>
</tr>
</tbody>
</table>

Elective (select program)
- Has/will this course be(en) submitted for core curriculum consideration? No

Has/will this course be(en) submitted for Writing or Communication consideration? No

Has/will this course be(en) submitted for
## Course Syllabus

<table>
<thead>
<tr>
<th>Syllabus:</th>
<th>Upload syllabus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upload syllabus</td>
<td><a href="#">2018-19 OCEN 311 syllabus rev.docx</a></td>
</tr>
</tbody>
</table>

**Letters of support or other documentation**

- No

**Additional information**

**Reviewer Comments**

- **Sandra Williams (sandra-williams)** (11/17/17 8:29 am): Edits made to catalog and enforced prerequisites.
- **Bob Knight (bob-knight)** (01/26/18 9:50 am): How will learning outcomes be measured?
- **Robert Randall (r-randall)** (01/31/18 5:35 pm): The learning outcomes will be measured by the students performance on homework assignments and exams. The students must submit written assignments that are a measure of written communication. R. Randall 1/31/2018
- **Sandra Williams (sandra-williams)** (02/01/18 1:35 pm): Update received. Concerns addressed.
- **Sandra Williams (sandra-williams)** (02/05/18 2:16 pm): UCC approved February 2018.

**Reported to state?**

- Add
### Course Syllabus

<table>
<thead>
<tr>
<th>Week</th>
<th>Activity</th>
<th>Topic</th>
<th>Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Fluid properties; dimensions and units; ideal gas law</td>
<td>Chapter 1.1-1.9</td>
</tr>
<tr>
<td>2</td>
<td>HW1</td>
<td>Fluid statics; pressure measurements</td>
<td>Chapter 2.1-2.7</td>
</tr>
<tr>
<td>3</td>
<td>HW2</td>
<td>Hydrostatic forces on plane and curved surfaces</td>
<td>Chapter 2.8-2.10</td>
</tr>
<tr>
<td>4</td>
<td>HW3</td>
<td>Principles of buoyancy; flow along a streamline; the Bernoulli equation</td>
<td>Chapter 2.11, 3.1-3.2</td>
</tr>
<tr>
<td>5</td>
<td>HW4</td>
<td>Flow normal to a streamline; static and dynamic pressure; applying the Bernoulli equation to solve fluid mechanics problems</td>
<td>Chapter 3.3-3.6</td>
</tr>
<tr>
<td>6</td>
<td>Exam 1</td>
<td>Energy and hydraulic grade lines; fluid kinematics (the velocity field); streamlines, streaklines and pathlines.</td>
<td>Chapter 3.7, 4.1</td>
</tr>
<tr>
<td>7</td>
<td>HW5</td>
<td>Acceleration fields; system representation</td>
<td>Chapter 4.2-4.3</td>
</tr>
<tr>
<td>8</td>
<td>HW6</td>
<td>Control volume; Reynolds Transport Theorem; conservation of mass</td>
<td>Chapter 4.3-4.4, 5.1</td>
</tr>
<tr>
<td>9</td>
<td>HW7</td>
<td>Newton’s Second Law; conservation of momentum; First Law of Thermodynamics; energy equation</td>
<td>Chapter 5.2-5.3</td>
</tr>
<tr>
<td>10</td>
<td>HW8</td>
<td>Application of mass conservation equation, momentum conservation equation, and energy equation to solve problems</td>
<td>Chapter 5.3</td>
</tr>
<tr>
<td>11</td>
<td>Exam 2</td>
<td>Dimensional analysis; Buckingham Pi Theorem.</td>
<td>Chapter 7.1-7.6</td>
</tr>
<tr>
<td>12</td>
<td>HW9</td>
<td>Modeling and similitude; typical model studies; laminar flow</td>
<td>Chapter 7.8-7.9, 8.1-8.2</td>
</tr>
<tr>
<td>13</td>
<td>HW10</td>
<td>Basics of turbulent pipe flow; major and minor losses; Moody diagram</td>
<td>Chapter 8.3-8.5</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>Lift and drag; boundary layers</td>
<td>Chapter 9.1-9.4</td>
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<tr>
<td>15</td>
<td></td>
<td>Final Exam: TBD</td>
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**Class:** MWF 9:10-10:00 am, HEB 118  
**Office Hours:** MWF 2:00-4:00 or by appointment  
**Instructor:** Dr. Robert E. Randall, Office: HEB 139C, Phone: 845-4568, Email: r-randall@tamu.edu  


**Course Description:** Fluid properties; statics; kinematics; ideal gas law; potential flow; basic conservation principles of continuity, momentum and energy; Bernoulli equation; similitude and hydraulic models; incompressible flow in pipes; fluid dynamic drag; boundary layer basics. Prerequisites: MATH 251 and OCEN221 or CVEN221
Course Objectives: The course objectives are to apply the fundamentals of fluid statics and dynamics to the analysis of fluid flow applications in ocean engineering: hydrostatic forces on structures, calculation of fluid flowrates through pipes, energy losses in pipelines, design of scale models in fluid flow, viscous drag and lift forces.

Learning Outcomes: The outcomes attained in this course are:
- the ability to apply knowledge of mathematics, science, and engineering science.
- the ability to identify, formulate, and solve engineering problems.
- an ability to communicate effectively.
- the ability to calculate forces as a result of hydrostatics and hydrodynamic flow.
- the ability to use continuity, momentum, and energy equations to solve ocean engineering problems.
- the ability to evaluate drag and lift forces on bodies in fluid flow.
- the ability to size ocean engineering physical models for estimating prototype performance.
- the ability to analyze fluid flow in pipes.

Measurement of Learning Outcomes: The learning outcomes are measured by the student’s satisfactory performance on homework assignments and exams. The students submit written homework assignments that are a measure of the student’s ability to communicate effectively.

Reading Assignments: Students are responsible for reading the relevant material in the text as stated in the course syllabus.

Grading Distribution and Policy: The course grade is based on homework (20%), two in-class exams (25% each), and one 2-hour final exam (30%). Grading scale: A = 90-100, B = 80-89, C = 70-79, D = 60-69, F = <60.

Homework will be assigned once a week and will be due in one week at the beginning of class. No late homework will be accepted except for a university-excused absence or instructor excused absence. Two 50-minute in-class exams and a two-hour final examination are scheduled. During exams, a standard calculator that has no ability to transmit or receive information is used and all electronic devices must be turned-off for the duration of the exam.

Absences: The University views class attendance as an individual student responsibility. Students are expected to attend class and to complete all assignments. For more details, please see Part I, Rule 7 of the Texas A&M University Student Rules at http://student-rules.tamu.edu/rule07.


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 the Disability Services, currently located in the Disability Services building at the Student Services at White Creek complex on west campus or call 979-845-1637. For additional information visit http://disability.tamu.edu.