SIOC 202A – FUNDAMENTALS OF WAVE PHYSICS

Welcome to the Course

Course Information

<table>
<thead>
<tr>
<th>Course Description</th>
<th>This course covers topics in surface waves and acoustic waves.</th>
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<tr>
<td>Credits</td>
<td>4 units/credit hours of lecture</td>
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<tr>
<td>Instructor</td>
<td>Xuanting Hao and Ying-Tsong Lin</td>
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Prerequisites: familiarity with undergraduate-level fluid mechanics, calculus, ODE and PDE.

Classes
In-person lectures: MW 9:00am-10:20am Location: Spiess Hall 330

Office hours:
Hao (week 1-5): MW 8:00am-9:00am Location: Keck Center 367 Email: x3hao@ucsd.edu
Lin (week 6-10): M 10:35am-2:20pm W 10:35am-1:10pm Location: Spiess 460 Email: ytlin@ucsd.edu

Asynchronous (Online) Course Elements:
UC San Diego’s Learning Management System: https://canvas.ucsd.edu
Login: UC San Diego Active Directory credentials
Purpose: Assignment submissions, lecture slides

Course Materials and Tools

Text/Readings/Other Material

Textbooks
Surface waves:
- Rick Salmon, Introduction to Ocean Waves (lecture notes, to download: http://www-pord.ucsd.edu/rsalmon/)

Acoustic waves: (freely accessible through UCSD VPN)

Recommended reading:
• Discovery of Sound in the Sea [https://dosits.org/](https://dosits.org/)
• Ocean Acoustics Library – OALIB [https://oalib-acoustics.org/](https://oalib-acoustics.org/)

Assignments, Projects, and Grading

Summary of Grade Criteria

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<tr>
<th>Assignment</th>
<th>Weight</th>
<th>Due Date</th>
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<tr>
<td>Required assignments (8)</td>
<td>75%</td>
<td>11:59 pm weekly (submit online)</td>
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<tr>
<td>Final exam</td>
<td>25%</td>
<td>03/20/2024 W 8:00a-10:59a Location: TBD</td>
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Course Schedule (subject to change)

<table>
<thead>
<tr>
<th>Week</th>
<th>Title / Topic</th>
<th>Activities, Assessments, and Due dates</th>
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<tr>
<td>1</td>
<td>• Kinematics of monochromatic waves • Two waves</td>
<td>Homework due on 1/21</td>
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<tr>
<td>2</td>
<td>• Wave statistics (multiple waves) • Hydrodynamics (deep water)</td>
<td>Homework due on 1/28</td>
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<tr>
<td>3</td>
<td>• Hydrodynamics (finite depth) • Shoaling waves</td>
<td>Homework due on 2/4</td>
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| 4 | • Shallow water equation  
   • Ship waves | Homework due on 2/11 |
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<tr>
<td>5</td>
<td>• Wave forces</td>
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| 6 | • Introduction of Ocean Acoustics  
   • Linear Acoustic Wave Equation and Fundamental Solutions | Homework due on 2/23 |
| 7 | • Wave Reflection and Wave Refraction | Homework due on 3/1 |
| 8 | • Scattering, Diffraction, Caustics and Shadow Zones  
   • Ocean Acoustic Waveguide | Homework due on 3/8 |
| 9 | • Ocean Environmental Acoustics  
   -- Marine Mammal Acoustics  
   -- Seabed and Sediment Acoustics  
   -- Ambient Sound and Soundscape Informatics  
   -- Global Scale Undersea Sound Propagation: T-phase waves | Homework due on 3/15 |
| 10 | • Applications of Ocean Acoustics  
    • SONAR Equations | |

**Campus and Course Policies**

We expect students to attend every lecture. UC San Diego permits absence for participation in religious observances; see [Academic Regulations & Policies (ucsd.edu)](http://ucsd.edu). UC San Diego expects
all students will adhere to its standards of academic integrity; see UCSD Policy on Integrity of Scholarship.

Grading policy:
1. Late submissions:
   Late submissions are allowed, but with limitations. Late submissions will be accepted within one day (24 hours) following the original assignment deadline and will be capped at 50% of the total grade. Therefore, it is strongly encouraged to submit assignments on time to maximize the potential for a higher grade.
2. Extensions: Extensions of assignment deadlines will only be granted in exceptional circumstances. Students should contact their instructor as soon as possible if they believe they have a valid reason for an extension.

**Accommodations for Students with Disabilities**
If a student foresees the need for accommodations, they should promptly schedule a meeting with the professor. Before accommodations can be implemented, students are required to furnish an Authorization for Accommodation (AFA) letter from the UCSD Office for Students with Disabilities (OSD). It's important to note that accommodations cannot be applied in hindsight, such as after an exam has taken place.

**Campus Policies**
- UC San Diego Principles of Community
- UC San Diego Policy on Integrity of Scholarship
- Religious Accommodation
- Nondiscrimination and Harassment
- UC San Diego Student Conduct Code