ECIV 790: Environmental Application of Boundary Layer Theory

SEMESTER   Spring 2008

OBJECTIVE   Many natural and industrial flow problems can be simplified using the boundary layer concepts. Moreover, use of these concepts allows scientists and engineers to identify the most dominant parameters governing the flow process. The course is designed to help graduate students and professionals develop a skill in formal mathematical description of a physical flow process, then simplify the formulation and develop a solution strategy. Application of the theory will be focused more toward natural flow problems.

SCHEDULE   TTH 9:30AM- 10:45A, SWGN 2A07

INSTRUCTOR   Dr. Jasim Imran

CONTACT INFORMATION
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PREREQUISITE   Strong background in Fluid Mechanics & Partial Differential Equations.

OFFICE HOUR   WTH 3:45 pm to 4:45 pm

WEB PAGE   Course information including assignment, solution, grade, announcement, and supplementary information will be generally available in the Blackboard course web page.

REQUIRED TEXT   None. Handouts will be provided.

REFERENCES

COURSE OUTLINE
1. Introduction
2. Basic conservation laws
3. Index notation
4. Potential flow
5. Scaling argument
6. Integral analysis
7. Laminar boundary layer
8. Similarity solution
9. Turbulent boundary layer
10. Atmospheric and ocean currents
11. Jets and plumes
12. Open channel flow
13. Stratified flow

**Grading**

Final grades will be based on the following factors:

1. **Homework Sets (25%)**. Homeworks will be assigned throughout the semester. Your homework submission should be neat, legible, and written or typed on one side of 8.5”x11” paper.

2. **Projects, Mid-term exam (40%)** Two projects and a mid-term exam will constitute 40% of your grade.

3. **Final Exam (35%)** Typically given as a takehome exam.

The following scale will be used to determine letter grades:

<table>
<thead>
<tr>
<th>Percentage Range</th>
<th>Grade</th>
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<tbody>
<tr>
<td>90 to 100 %</td>
<td>A</td>
</tr>
<tr>
<td>85 to 89 %</td>
<td>B+</td>
</tr>
<tr>
<td>80 to 84 %</td>
<td>B</td>
</tr>
<tr>
<td>75 to 79 %</td>
<td>C+</td>
</tr>
<tr>
<td>70 to 74 %</td>
<td>C</td>
</tr>
<tr>
<td>65 to 69 %</td>
<td>D+</td>
</tr>
<tr>
<td>60 to 64 %</td>
<td>D</td>
</tr>
<tr>
<td>&lt; 60%</td>
<td>F</td>
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</tbody>
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**Class Policies**

Class Attendance: Required for on-campus students.

**Academic Calendar**

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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<tbody>
<tr>
<td>January 14, Mon.</td>
<td>Classes begin</td>
</tr>
<tr>
<td>January 18, Fri.</td>
<td>Last day to change/drop a course without a grade of ”W”</td>
</tr>
<tr>
<td>February 25, Mon.</td>
<td>Last day to drop a course without a grade of ”WF”</td>
</tr>
<tr>
<td>March 9-16, Sun.-Sun.</td>
<td>Spring break - no classes</td>
</tr>
<tr>
<td>April 2, Wed.</td>
<td>Graduate Student Day</td>
</tr>
<tr>
<td>April 28, Mon.</td>
<td>Last day of classes</td>
</tr>
<tr>
<td>April 30-May 7, Wed-Wed</td>
<td>Final examinations (includes exams on Sat.)</td>
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