1 Introduction

The primary objective of OCEN 678, aside from teaching a fundamental knowledge of the basic theorems and methods in fluid dynamics, is to provide each student with a sufficient background to read and understand the research literature in fluid dynamics. Journal articles typically go into much more depth than what this introductory course can cover, but the fundamental principles and methods remain the same. Moreover, an objective of the Ocean Engineering graduate program in general is to master oral presentation. Indeed, many of you will present the results of your research at a technical conference, in a thesis defense, and at invited seminars. To assess your progress toward learning the fundamentals of fluid dynamics and to give you practice at oral presentation, in this project you will create and deliver a 12 minute oral presentation with 3 minutes of questions on two articles from the research literature. You will also create a poster similar to those presented at poster sessions for major research conferences. With this practice, you will be well on your way to mastering the research literature in your area and preparing your conference presentations.

As a short summary, the final project consists of the following steps:

- Select two research articles published since 1990 that address viscous flow theory, environmental fluid mechanics, potential flow theory, or stratified flow and are related to each other. The articles must be selected from a quality fluid dynamics journal and emphasize the analytical analysis of a flow field that is free of the effects of surface waves.
Create a 12 minute PowerPoint presentation and expect 3 minutes of questions as if you were presenting the results of your selected article in a 15-minute presentation at a technical conference. You must comprehensively cite the literature used in your presentation. Because of the length of most journal articles, you will have to synthesize the results to the key points so that your fellow students can understand the papers in the short span of 15 minutes.

Create a poster for inclusion in a poster session summarizing the major points in your selected journal articles. Poster must fit within a 4 ft by 4 ft area. Remember that for posters, less is more: keep your fonts a reasonable size and emphasize only the key points of your topic. Citations to all literature references used are required.

On the scheduled final exam day you will email your presentation and poster to Dr. Soccolofsky (socolofs@tamu.edu) and hand in a hard copy of your poster at the scheduled presentation. You will also give a 12 minute presentation from your PowerPoint slides followed by 3 minutes of questions.

2 Journal Article

The journal articles you select should illustrate how the tools we are learning in OCEN 678 are used to solve a research problem in fluid dynamics. The articles should address a problem in viscous flow theory, environmental fluid mechanics, potential flow theory, stratified flows or a combination of these topics. The solution presented in the articles should be analytical in nature (not numerical) and be something that each student in our course can comprehend after a 15 minute presentation. Thus, the papers should develop some of the theories or applications used in our course. A good example is the icicle flow problem presented in the viscous-flow homework assignment. Both articles used in the project should be directly related to one another: in general, one article will cite the other.

As stated above, the articles must have been published since 1990 and come from a quality fluid dynamics journal. I recommend Physics of Fluids or the Journal of Fluid Mechanics. To help you find an article, you should use the library electronic resources to view the on-line versions of these journals. It is also helpful to use the Web of Science (an online journal article database available through the TAMU library webpage) to search for articles written by authors you already know. I am also happy to help in your search, but I want you to make a diligent attempt on your own first.

3 Presentation

You will structure your presentation as if you were presenting the research in your journal article at a conference. While you would never present someone else’s research in a conference
setting, this is a good opportunity to practice conference-type presentations at the beginning of your research career. Your presentation must contain each of the following elements:

- **Title slide.** You should include a full reference for the journal articles you selected, along with typical information such as your name, the date, the venue where you are making the presentation, and any necessary acknowledgments.

- **Introduction/Motivation.** You should use a few slides at the beginning of your presentation to describe the problem that is posed in the article and put it in context as to why it is important. This is your chance to get the audience’s attention and interest and also explain basic background information that the average person in the audience may not know or remember, but is important to your topic.

- **Theory/Methods.** Here you should develop the theory and methods presented in the articles. You should start with first principles but quickly get into the details of the problem by recognizing that we already know several key facts (e.g. what a compressible fluid is, boundary layer approximation, Newtonian fluid, etc.). You should state these facts, but not derive them. Instead, you should spend time deriving the key, new results of the research article and filling in any critical information that we have not yet covered in class.

- **Significant results.** Once the general theory is developed, you should present the most important results. You will not have time to cover every detail. Thus, you should be selective and only present those results you find most important or interesting.

- **Conclusions.** The last section of your talk should summarize what you have already covered and draw the main conclusions. This is usually the hardest part, but a well-written journal article should have already done this work for you. Your job will be to extract the information and communicate it clearly to the class.

You will have 12 minutes to present your talk; please practice ahead of time and plan appropriately (i.e. you need more than 5 slides, but you probably cannot cover 35 slides or 25 equations).

Following your talk there will be 3 minutes for questions from the audience. I will also ask you one question. This will count similarly to an oral exam, so you should be diligent to understand all the important points in your selected article and how the article relates to similar topics we covered in class.

### 4 Poster

In addition to preparing the conference talk, you will also summarize the results of your journal articles in the form of a conference poster. The poster should fit in a 4 ft by 4 ft display area and include as a minimum a title, the names of the students preparing the
poster, a complete citation to the selected journal articles, and a clear summary of the important parts of the papers. Remember to use a decent font size. A poster is something that should get the attention of someone passing by, should communicate clearly, and not require a long period of reading. It is usually intended as a prop from which to explain your research project to interested people who stop by during a poster session. The poster should not be simply a collection of your PowerPoint slides.

5 Groups

For this project, you will work in groups of two students each. It is up to each individual group to determine their own division of labor. The only requirement is that both students present approximately equal time during the oral presentation.

6 Important Milestones

To keep you on task, please complete this project by meeting each of the following partial due dates:

- 2. November 2009. Turn in a copy of the citation to the journal articles you have selected along with the article abstracts.
- 7. December 2009. Email an electronic copy of a draft of your seminar presentation and poster. This does not have to be complete, but must show that diligent attempts have been made to complete the project.
- 15. December 2009. Project is due. You will give a 12 minute presentation followed by 3 minutes of questions. Turn in a CD of your presentation and poster and a hard-copy of the poster.

7 Grading

This project will replace the final exam in this course (worth 20% of your grade). Your grade for the project will be broken down as follows:

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meeting all milestones</td>
<td>5%</td>
</tr>
<tr>
<td>Appropriateness of articles</td>
<td>10%</td>
</tr>
<tr>
<td>Quality of PowerPoint slides</td>
<td>20%</td>
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<tr>
<td>Quality of oral presentation</td>
<td>20%</td>
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<tr>
<td>Answers to oral questions</td>
<td>10%</td>
</tr>
</tbody>
</table>
Quality of poster : 20%
Accuracy of presentation and poster: 10%
Overall effort : 5%