

AME 332–Fluid Mechanics Laboratory
Spring 2002

<http://www.nd.edu/~powers/ame.332>
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Faculty

Prof. J. M. Powers, Unit 2
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Professional Specialist

Mr. John F. Koenigshof, jkoenigs@nd.edu, 375 Fitzpatrick, 631-8131

Teaching Assistants

- Mr. Asad Asghar, aasghar@nd.edu, 118 Hessert, 631-4335, Tuesday, 1-3 PM, Unit 3, Unit 6
- Mr. Alejandro Espinoza, aespinoz@nd.edu, 357D Fitzpatrick, 631-9052, Thursday, 3-5 PM, Unit 4, Unit 7
- Mr. Muhammad Iqbal, Lead TA, miqbal@nd.edu, 114 Hessert, 631-7576, Wednesday, 3-5 PM, Unit 1, Unit 8
- Mr. John Siegenthaler, jsiegent@nd.edu, B-023, 631-8360, Monday, 3-5 PM, Unit 5

Prerequisites

AME 334 and AME 231

Catalog description

“Experimental study of fluid mechanics. Spring.”

Instructor’s Emphases

A major goal of the course will be for the student to develop strong technical writing skills. This includes use of appropriate organization, sentence and paragraph structure, neatness, effective use of graphs, proper presentation of equations, and appropriate error analysis. The other major goal of the course is to gain a better appreciation for fluid mechanics principles via direct quantitative and phenomenological observation. This includes verification of ideas and equations developed in AME 334 as well as extension into regimes for which no good theory exists but for which the best path to understanding is through direct empirical observation. How to properly distinguish purely theoretical results and equations, purely empirical results and curve fits, and mixes of both, will be an underlying theme.

Text

Fox, R. W., and McDonald, A. T., 1998, Fifth Edition, *Introduction to Fluid Mechanics*, Wiley, New York.

Lectures

Friday, 8:30-9:20 AM, 140 DeBartolo.

At the beginning of the course, lecture will meet weekly. As the course progresses, it will no longer be necessary to meet as frequently; the precise schedule will be determined during the semester. The laboratory staff can be consulted at any time about the experiments. E-mail is encouraged.

Use of laboratory

The students will do their experimental work in the Fluid Mechanics Laboratory, Room A-59 Fitzpatrick, at any time that is convenient for them, except between the hours of midnight and 6:00 AM. The combination is 1435. The laboratory will generally be unmonitored, but, for reasons of safety, there should be at least two people present for students to carry out their experiments. However, each afternoon, for two hours, a TA will be present in the laboratory, as noted earlier in the syllabus. Students should log in and out of the laboratory, indicating the times they have been there and the unit on which they have worked.

Grouping of experiments into units

The experiments are grouped into a total of eight units in the following manner:

- before spring break: Units 1-4,
- after spring break: Units 5-8.

There will be equipment for four units available at a time, and there is no particular order in which they should be done. The units are expected to be operational by 17 January 2002 for the first set and by 11 March 2002 for the second.

Sign-up

At most, two students can work together in the laboratory to do the experiments. All work outside the lab should be done separately, though discussions can take place. To avoid conflicts, students should sign up beforehand for a specific unit. Sign-up can be for at most two hours at a time on any given day, though work can continue if no one else wants to use the equipment.

Procedure

The objectives for each unit will be outlined, but only minimal instructions will be given on the laboratory procedures. Handouts and references to other written material will be provided; some will be on the course web page (<http://www.nd.edu/~powers/ame.332>), and others in the laboratory. The students will have to read the appropriate material, decide on operating procedures and calculations to be performed, and take all the data that they need. It is suggested that the students sign up for two laboratory sessions a week on different days, one to familiarize themselves with the equipment and to plan the experiment, and the other to actually take the data. They can come back to the laboratory if any further information is needed. There is no minimum or maximum on the time spent in the laboratory. Data should be neatly recorded in a laboratory notebook.

Safety

Safety is an important subject in the education of an engineer, but is especially important here since the students will be left on their own in the laboratory. The equipment has been

designed with this in mind, with all reasonable effort having been made in that regard. Students should, however, be conscious of safety at all times: they should think carefully before switching on machinery or electrical equipment, and otherwise comport themselves in a manner that will not endanger themselves or others. Emergency telephone numbers are prominently displayed in the laboratory.

Maintenance

Equipment in the laboratory will be maintained in good, working order. However, it is possible that a breakdown could occur which may or may not disable an experiment. In either case, the student(s) involved should immediately send an e-mail to the laboratory staff; the equipment will be fixed as soon as possible. Other than that, students should clean up their workspace and leave the equipment as they found it.

Required Work and Grading

Grades will be assigned based on students' performance on laboratory reports and examinations. Lab reports are *required* to be done using the L^AT_EX text formatter. See the course web page for a L^AT_EX template. Some items regarding report format and style can also be found on the course web page. Note that the *maximum* page limit (excluding title/abstract and honesty declaration) for each unit's report is *six pages*. The weights, dates, and personnel assigned to each are as follows:

Report 1,	8	Friday, 8 February 2002, 8:30 AM
Report 2,	8	Friday, 15 February 2002, 8:30 AM
Report 3,	8	Friday, 22 February 2002, 8:30 AM (JPW, plan ahead)
Report 4,	8	Friday, 1 March 2002 8:30 AM
Midterm Exam	10	Friday, 8 March 2002, 8:30-9:20 AM
Report 5,	8	Friday, 5 April 2002, 8:30 AM
Report 6,	8	Friday, 12 April 2002, 8:30 AM
Report 7,	8	Friday, 19 April 2001, 8:30 AM
Report 8,	8	Friday, 26 April 2002, 8:30 AM
Final	26	Wednesday, 8 May 2002, 8:00-10:00 AM
Total	100	

A Office of Student Affairs-approved written excuse must be provided in case of absence during an examination, or if a due date is missed for a laboratory report. All work must be completed to receive a passing grade.

Honesty Policy

Academic honesty is expected. When confronted with an apparent violation, I will enforce the honor code to the best of my ability. I will also try to make my expectations clear. By and large, though, these issues are out of my control and as such I do not seek out violations. Instead, I expect your basic integrity will prevent any problems. After many years serving on honesty committees, I have noticed a significant majority of cases brought forward have their origins in laboratory courses. I have also noticed in those hearings that a common perception of many students is that somewhat looser standards of integrity should apply for laboratory courses relative to lecture courses. I do not accept this notion.

In brief my expectations are as follows. I encourage you to freely discuss the laboratories amongst one another as you formulate your reports *individually*. *Your* written work should

represent *your* understanding of the laboratory. In practice this means copying (in whole or in part) another student's laboratory report, exam, or any other classwork, from this or any previous semester is *not* permitted. This includes plots of data, for which each student is expected to make her or his own for reports. If you choose to discuss your work with a colleague, it should be a discussion in which one teaches another or both work to a mutual understanding. As a counter-example, it is not acceptable to give a friend your report the night before the due date so that friend can copy your work. In your written reports, be careful to correctly use quotation marks for words that did not originate with you. Also be sure to properly cite all sources you used. As is done in the scientific literature, you should *briefly* acknowledge in writing any significant discussions or interactions you had regarding the work you submit. As a general principle, I do not accept the justification that you were not sure of my intentions. If you feel you may be in an ethical grey area, then you should consult with me *before* acting.

Students must include a signed *Declaration* at the end of each report (see web page for a sample) affirming that, though there may have been collaboration with another person in doing the experiment, taking data, and discussion, everything in the report itself represents his or her work.