ENGG*6090: Flow-Induced Vibrations
Fall 2014

School of Engineering

(Rev 1.0 – May 2014; SOE Graduate Committee Review)

1 INSTRUCTOR

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Email: mahassan@uoguelph.ca
Office hours: by appointment

2 LEARNING RESOURCES

2.1 Course Website

Course material, news, and announcements will be regularly posted to the ENGG*6090 Courserlink site. You are responsible for checking this site regularly.

2.2 Required Resources

2.3 Recommended Resources


2.4 Additional Resources

Lecture Information: Lecture notes will be posted on the Courserlink site.
Lab Information: Computer Lab information will be posted on Courserlink site. There are no experimental labs.
Assignments: Assignment and project descriptions will be posted on the Courserlink site.
3 ASSESSMENT

3.1 Dates and Distribution

Major Project – 40%
Critical Review – 10%
Assignments + lecture presentation – 50%
(dates TBD)

3.2 Course Grading Policies

When You Cannot Meet a Course Requirement: When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the instructor in writing, with your name, student ID#, and e-mail contact. See the graduate calendar for information on regulations and procedures for Academic Consideration:
http://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/sec_d0e1400.shtml

Accommodation of Religious Obligations: If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor within two weeks of the start of the semester to make alternate arrangements. See the undergraduate calendar for information on regulations and procedures for Academic Accommodation of Religious Obligations:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-accomrelig.shtml

Passing grade: As per Graduate Calendar regulations.

Lab Work: There is no experimental laboratory work.

Late Submissions: Late submissions (without approved accommodations as note above) will be penalized. 10% for 2-24 h late and 30% for >24 and <72 h late. Submissions more than 72 h late will not be accepted.
4 AIMS & OBJECTIVES

4.1 Calendar Description

This course provides a physical understanding of fluid-structure interaction problems, with an emphasis on analytical and numerical methods. Topics include vortex and turbulence induced vibration, galloping and flutter, fluid-elastic instability, and acoustic resonance. Examples of applications to cylindrical structures such as smoke stacks, marine risers, nuclear reactor internals, heat exchangers, and biomedical applications are discussed.

Prerequisites: undergraduate engineering courses in fluid mechanics, dynamics and vibrations, or consent of the instructor.

4.2 Course Aims

This course aims to establish an understanding of the complexities of vibrations of structures subjected to fluid flow. This understanding will transcend a wide spectrum of industrial applications. The main goals of the course are to build numerical tools to design and to critically assess the integrity of structures.

4.3 Learning Objectives

At the successful completion of this course, the student will have demonstrated the ability to:

1. Simplify complex structure to a lower order system that can be analysed.
2. Develop computer programs for mid-complexity MDOF models for structural vibrations.
3. Anticipate limitations associated with a given model (Fluid and structure).
4. Assess current design for structural integrity.
5. Interpret published engineering articles associated with flow-induced vibrations.

4.4 Instructor’s Role and Responsibility to Students

The instructor’s role is to develop and deliver course material in ways that facilitate learning for a variety of students. Selected lecture notes will be made available to students on Courselink but these are not intended to be stand-alone course notes. During lectures, the instructor will expand and explain the content of notes and provide example problems that supplement posted notes. Scheduled classes will be the principal venue to provide information and feedback.

4.5 Students’ Learning Responsibilities

Students are expected to take advantage of the learning opportunities provided in the course. Students, especially those having difficulty with the course content or with weaker backgrounds, should also make use of other resources. Students may be asked to participate in preparing short lectures of their choice. Students who do (or may) fall behind due to illness or other compassionate grounds are advised to keep the instructor informed.
E-mail Communication: As per university regulations, all students are required to check their <uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

Recording of Materials: Presentations which are made in relation to course work—including lectures—cannot be recorded in any electronic media without the permission of the presenter, whether the instructor, a classmate or guest lecturer.

4.6 Relationships with other Courses

Previous Courses:
Undergraduate engineering courses in fluid mechanics, dynamics and vibrations. The course will also rely on the structural dynamics knowledge gain in course such as dynamics, vibrations, and fluid mechanics. However, the instructor will allocate a few lectures to Students who are weak or lacking in one or more of these areas should expect to invest additional time.

5 Teaching and Learning Activities

5.1 Timetable

Lectures:
TBD

Laboratory:
TBD

5.2 Course Topics and Schedule

<table>
<thead>
<tr>
<th>Topic</th>
<th>Nominal Weeks</th>
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</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>FIV Classification</td>
<td>1</td>
</tr>
<tr>
<td>Review of vibration</td>
<td>3</td>
</tr>
<tr>
<td>Review of Fluid Mechanics</td>
<td>1</td>
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<tr>
<td>Bluff Bodies</td>
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<tr>
<td>Vortex Shedding</td>
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<tr>
<td>Vibrations Induced by Turbulence</td>
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<tr>
<td>Instability of Tube Arrays</td>
<td>1</td>
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<tr>
<td>Introduction to acoustics</td>
<td>1</td>
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</tbody>
</table>
6 Lab Safety

Safety is critically important to the School and is the responsibility of all members of the School: faculty, staff and students. As a student in a lab course you are responsible for taking all reasonable safety precautions and following the lab safety rules specific to the lab you are working in.

6.1 Course Specific

There will be no experimental labs associated with this course.

7 Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection. The Academic Misconduct Policy is detailed in the Graduate Calendar: 
http://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/sec_d0e1687.shtml

7.1 Resources

A tutorial on Academic Misconduct produced by the Learning Commons can be found at: 
http://www.academicintegrity.uoguelph.ca/

The Graduate Calendar is the source of information about the University of Guelph’s procedures, policies and regulations which apply to graduate programs:
7.2 Course Specific

Any team work within the course expects and requires all members of the team to be active and significant contributors to all aspects of that team submission.