1 INSTRUCTIONAL SUPPORT

1.1 Instructor

Instructor: Bahram Gharabaghi, Ph.D., P.Eng.
Office: THRN 2417, ext. 58451
Email: bgharaba@uoguelph.ca
Office hours: TBA on Courselink or by appointment

2 LEARNING RESOURCES

2.1 Course Website

Course material, announcements, and grades will be regularly posted to the Courselink site. You are responsible for checking the site regularly.

2.2 Required Readings

1. Required readings will be assigned throughout the term.

2.3 Recommended Resources


3 ASSESSMENT

3.1 Dates and Distribution

Weekly Literature Review and Problem Assignment: (worth 5% x 10 = 50%)
Students will select a peer-reviewed paper from a suggested reading list and prepare a one-page
critical review of the paper. Problems will be assigned from the textbook on a weekly basis.
Students will present the critical review of the paper and the solution to the assigned problems to the
class. The one-page critical reviews, solutions to assigned problems and the presentations must be
submitted electronically on Courselink by noon and presented in-class on the due dates, as follows:

<table>
<thead>
<tr>
<th>Problem Assignment &amp; Presentation</th>
<th>Literature Review &amp; Presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Wed. May 25th</td>
<td>Mon. May 30th</td>
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<tr>
<td>2 Wed. June 1st</td>
<td>Mon. June 6th</td>
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<tr>
<td>3 Wed. June 8th</td>
<td>Mon. June 13th</td>
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<tr>
<td>4 Wed. June 15th</td>
<td>Mon. June 20th</td>
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<tr>
<td>5 Wed. June 22nd</td>
<td>Mon. June 27th</td>
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Research Proposal & Presentation (worth 15% + 5% = 20%) - due Wednesday June 29th - to be
submitted electronically on Courselink Dropbox by noon and presented in-class on the due date. The
proposal will concisely (less than 7 pages) discuss a well-defined problem to be researched; include
a brief chronologic review of previous work on the selected topic with key references; outline the
objectives and scope of the proposed work to be conducted; briefly suggest key data that needs to be
compiled and engineering tools that will be used; and discuss the key deliverables; late submissions
will have a penalty of 25% per day.

Term Project & Presentation (worth 20% + 10% = 30%) - due Monday August 8th - the term project
report will be submitted electronically through Courselink Dropbox by noon and presented in-class.
This final class will start at 1:00 PM till 5:00 PM on Monday August 8th. The purpose of the term
project is to provide an opportunity for the student to gain a deeper understanding of theory and
practice of the finite element methods. They will use commercially available software to build
and solve virtual models in practical engineering applications.

3.2 Course Grading Policies

Missed Assessments: If you are unable to meet an in-course requirement due to medical, psychological,
or compassionate reasons, please email the course instructor. Please note the passing grade in
graduate courses is 65%. 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-acomrelig.shtml
4 AIMS & OBJECTIVES

4.1 Course Description
This course focuses on the fundamentals of Finite Element Theory, including the numerical methods that provide solutions to the governing differential equation systems, which quantitatively describe several processes of interest. Key topics that will be covered include: boundary-value problems, methods of approximation, time dependent problems, isoparametric elements, numerical integration, computer implementation, automatic mesh generation algorithms, and two-dimensional finite elements. This course places emphasis on hands-on experience with the state-of-the-art computer programs, and understanding the assumptions and limitations of the finite element methods in analyzing engineering problems. Prerequisite(s): none; Restriction(s): none.

4.2 Course Aims
This course aims to introduce both the capabilities and limitations of numerical methods for solving the complex non-linear governing differential equations, and techniques for using commercially available software to build and solve virtual models in practical engineering applications. This course aims at equipping the students with an understanding of theory and practice of the finite element methods.

4.3 Learning Objectives
At the successful completion of this course, the student will have demonstrated:
1. an understanding of the theory and application of the finite element method
2. the ability to formulate a finite element analysis for a variety of problems
3. the ability to use a general purpose finite element computer program
4. knowledge of the assumptions and limitations of the finite element method
5. articulate the major approximations in the analysis and associated errors
6. recognize the limits of the tool and assessing the validity of the conclusion
7. interpret and communicate computational results in a final report

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/D2L 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 for tests and project.

4.5 Students’ Learning Responsibilities
Students are expected to take advantage of the learning opportunities provided during lectures and tutorials. Students, especially those having difficulty with the course content, should also make use of other resources recommended by the instructor. Students who do (or may) fall behind due to illness, work, or extra-curricular activities are advised to keep the instructor informed. This will allow the instructor to recommend extra resources in a timely manner and/or provide consideration if appropriate.

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.
5  TEACHING AND LEARNING ACTIVITIES

5.1  Class Time and Location

Lectures/Seminars:
   Monday & Wednesday       6:00 – 8:50 pm    THRN 1002

5.2  Class Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Lecture/Seminar Topics</th>
<th>References</th>
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</thead>
<tbody>
<tr>
<td>Mon. May 16th</td>
<td>Introduction – Basic Concepts</td>
<td>Chapter 1</td>
</tr>
<tr>
<td>Wed. May 18th</td>
<td>One-Dimensional Linear Element</td>
<td>Chapter 2</td>
</tr>
<tr>
<td>Mon. May 23rd</td>
<td>Holiday - NO CLASSES SCHEDULED</td>
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<tr>
<td>Wed. May 25th</td>
<td>A Finite Element Example</td>
<td>Chapter 3</td>
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<tr>
<td>Mon. May 30th</td>
<td>Element Matrices: Galerkin Formulation</td>
<td>Chapter 4</td>
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<tr>
<td>Wed. June 1st</td>
<td>Two-Dimensional Elements</td>
<td>Chapter 5</td>
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<td>Mon. June 6th</td>
<td>Coordinate Systems</td>
<td>Chapter 6</td>
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<tr>
<td>Wed. June 8th</td>
<td>Two-Dimensional Field Equation</td>
<td>Chapter 7</td>
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<td>Mon. June 13th</td>
<td>Derivative Boundary Conditions</td>
<td>Chapter 9</td>
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<td>Wed. June 15th</td>
<td>Irrotational Flow</td>
<td>Chapter 10</td>
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<td>Mon. June 20th</td>
<td>Heat Transfer by Conduction and Convection</td>
<td>Chapter 11</td>
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<td>Wed. June 22nd</td>
<td>Time-Dependent Field Problems</td>
<td>Chapter 14</td>
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<tr>
<td>Mon. June 27th</td>
<td>Practical Considerations</td>
<td>Chapter 15</td>
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<tr>
<td>Wed. June 29th</td>
<td>Term project proposal presentations</td>
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<tr>
<td>Mon. Aug. 8th</td>
<td>Term project final report presentations</td>
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5.3  Other Important Dates

Drop Date: The last date to drop one-semester courses, without academic penalty, is the 40th class day for one-semester courses (Friday July 8th, 2016). Two-semester courses must be dropped by the last day of the add period in the second semester. Refer to the Graduate Calendar for the schedule of dates:
http://www.uoguelph.ca/registrar/calendars/graduate/current/sched/sec_d0e736.shtml

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. In addition, you are responsible for reporting all safety issues to the laboratory supervisor, GTA or faculty responsible.
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.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member.

8 Accessibility

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Centre for Students with Disabilities as soon as possible.

For more information, contact CSD at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website: https://www.uoguelph.ca/diversity-human-rights/accessibility

9 Resources

- The Academic Misconduct Policy is detailed in the Graduate Calendar: http://www.uoguelph.ca/registrar/calendars/graduate/2013-2014/genreg/sec_d0e1911.shtml
- 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: http://www.uoguelph.ca/registrar/calendars/graduate/current/
- Refer to the Graduate Calendar for the schedule of dates: http://www.uoguelph.ca/registrar/calendars/graduate/current/sched/sec_d0e736.shtml