Calendar Description

Instructors
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Name: Professor C.R. (Bob) Koch
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Name: Professor S. Bhattacharjee
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Teaching Assistants
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Name: Alex Schramm E-mail: schramm<at>ualberta<dot>ca

Requisites
Prerequisites: Math 101 and EN PH 131

Text Book
Introduction to Thermal and Fluid Engineering, D. A. Kaminski and M. K Jensen, 2005
Note: publisher delay, text arriving at the end of September — first few chapter available online.

Homepage
e-class (use your CCID login and password)
https://vista4.srv.ualberta.ca/webct/entryPageIns.dowebct

Schedule
Lectures: TR, 8:00–9:20 (ETL E1 003)
Labs: MW, 1200–1250 (NRE 2 003 and HC L 1) starting Sept 12

Mark Distribution
Homework, Lab and Quizzes : 10% (see below for details)
Midterm Exam 1: 25% (Tues., Oct 11, 2011, 8:00–9:20)
Midterm Exam 2: 25% (Tues., Nov 8, 2011, 8:00–9:20)
Final Exam: 40% (Fri, December 16, 2011, 900–1100 – tentative – see Beartracks in the last week of classes)

Course Objectives
This course provides an introduction to Thermosciences needed in mechanical engineering. In particular, the physics of heat transfer and fluid mechanics are introduced.

- Understand the process of converting real thermal fluid situations to physical and mathematical models
- Calculate work and macroscopic forms of energy from first principles
- Understand underlying principles of internal energy, conduction and convection
- Calculate the conduction and convection heat transfer from engineering models and using an electrical analogy
- Classify a Conduction/Convection problem by the Biot Number and solve transient lumped heat capacity problems
- Use properties of liquids like density, viscosity, surface tension in calculating pressure in a fluid
• Calculate static pressure and forces on immersed objects and surfaces
• Energy balance using control volumes to determine velocities and pressures in frictionless, isothermal, incompressible flows
• Understand Reynolds transport theorem for an intensive property - mass and momentum
• Use of a control volume, calculate forces from fluids using Newton’s second law
• Calculate pipe flow with losses using the Bernoulli equation with losses.

Course Outline
1. Introduction to Thermofluids
2. Natural Sciences of work, heat and energy
3. Fluid Statics and fluid properties and the Bernoulli equation from energy conservation
4. Reynolds transport and balance of momentum
5. Internal flow with losses – pipe flow

Seminars
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<td>Sem 1 – Control Volume</td>
<td>Sept 12–14</td>
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<td>Sem 2 – Conservation Laws</td>
<td>Sept 19–21</td>
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<td>Sem 3 – Lumped Heat Capacity</td>
<td>Sept 26–28</td>
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<td>Sem 4 – Review - optional</td>
<td>Oct 3–5</td>
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<td>Sem 5 – Viscosity of Fluids</td>
<td>Oct 17–19</td>
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<td>Sem 6 – Density Measurements</td>
<td>Oct 24–26</td>
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<td>Sem 7 – Review - optional</td>
<td>Oct 31, Nov 2</td>
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<td>Sem 8 – Deflecting Jet</td>
<td>Nov 14–16</td>
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<td>Sem 9 – Tank Draining</td>
<td>Nov 21–23</td>
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<td>Sem 10 – Review - optional</td>
<td>Dec 5–7</td>
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Assignments
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Notes
• Assignments are due at 1:00 p.m., on the dates detailed above or as announced by Profs. Kostiuk or Bhattacharjee or Koch in class. Please hand the lab and the assignment in the appropriate box on the 4th floor (near the Mec E Office).
• Seminars work due at the end of the seminar or as per instruction by the TA.
• Assignments and exams are based on lecture, seminar and assignment material.
• The use of engineering judgment is essential when solving problems as a practicing engineer. Answers from work submitted by the student must: follow from the solution development, have consistent units, and have a correct magnitude and sign.
• Faculty of Engineering approved Non-Programable calculator only
• Course handouts, student Grades (except for final grade), etc. will be posted, on the course website.
• Policy about course outlines can be found in section 23.4(2) of the University Calendar.
• “The University of Alberta is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Code of Student Behaviour (online at www.governance.ualberta.ca) and avoid any behaviour which could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University.”