MEC E 541 - Combustion Engines and Alternative Fuels

Fall 2011 LEC A1

Instructor: Daniel Handford, dan.handford@ualberta.ca
Mec E 2-11, 492-7210
Office Hours: TR 10:00 – 12:00?

Teaching Assistant: Masoud Mashkournia, masoudm@ualberta.ca
Mec E 4-28
Office Hours: M 13:00 – 15:00?

Calendar Description:
3.0 (fi 6). History of basic cycles; combustion theory including ignition, flame propagation and engine knock; cycle analysis with deviations from ideal cycles and performance characteristics; fuels; design and operation of carburation and injection processes; exhaust emissions measurements. Identification of design parameters and their effects on emissions. Pre-requisite: MECE 340

Textbooks:
Required: MEC E 541 Notes (MEC E Club)
Recommended: Internal Combustion Engine Fundamentals
Recommended: Thermodynamics textbook (your MEC E 340 text)
Reference: Introduction to Internal Combustion Engines
Richard Stone, SAE International (SAE, Library)

Course Material:
Some course material (Assignments, Solutions, etc.) will be posted in eClass. Selected questions from past midterm and final exams will be made available on eClass for exam preparation.

Course Outline:
1. History of Engines and Cycles
2. Ideal Gas Thermodynamics
   a. Review of Air Cycles and Gas Mixture Properties
   b. Fuel/Air Mixtures, Reactions, Flame Temperature and Pressures
3. Equilibrium Combustion Analysis
4. Real Mixture Cycle Analysis and Ideal Otto Cycle Engines, Actual Combustion Processes and Effects on Engines, Diesel Engine Combustion and Cycle Analysis
5. Engine controls, pollutants, exhaust treatment
6. Alternative Fuels and Alternative Engines (time permitting)
**Evaluation:**

Assignments (5) 20%
Midterm Exam (W Oct. 19, 13:00-13:50) 30%
Final Exam (TBD - W Dec. 14, 14:00-17:00?) 50%

Assignments are due in class. Solutions will be posted the following day at noon – late assignments will have the grade reduced by 10% if handed in before solution is posted, otherwise will get a grade of zero.

**Grades Policy:**
Grades are determined by a combination of typical distributions and absolute standards.

**Calculator Policy:**
Only approved programmable or non-programmable calculators are allowed in exams (see details at www.engineering.ualberta.ca/en/Students/Accepted/CalculatorSpecs.aspx)

**Academic Dishonesty Policy:**
"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 http://www.uofaweb.ualberta.ca/gfcpolicymanual/ 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."

**Policy Policy:**
"Policy about course outlines can be found in §23.4(2) of the University Calendar. Nothing in any course outline, syllabus or course web-site may override or contravene any Calendar regulation or GFC policy. In resolving any discrepancy, GFC policy and Calendar regulations will take precedence."