

**MIE 1122S - Combustion Engine Processes**  
**Winter 2019 (Tentative)**

**Lecturer:**

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**Lectures:**

Thursdays, 4-7 PM, MC 306

**Course webpage:** <https://idpz.utorauth.utoronto.ca>

**Required Textbook:**

***Internal Combustion Engine Fundamentals*** (Note: new edition available. Pending review, the 2<sup>nd</sup> edition might be specified for Winter 2019).

John B. Heywood (JBH), McGraw-Hill, 1988.

[Note about the textbook: The hardcover edition of Heywood is outrageously expensive. Paperback editions are available on Amazon at very substantial cost savings:

[https://www.amazon.ca/Internal-Combustion-Engine-Fundamentals%20Heywood/dp/0071004998/ref=sr\\_1\\_2?ie=UTF8&qid=1291920953&sr=8-2](https://www.amazon.ca/Internal-Combustion-Engine-Fundamentals%20Heywood/dp/0071004998/ref=sr_1_2?ie=UTF8&qid=1291920953&sr=8-2) ]

**Marking Scheme** - final mark is based on the weighted sum of:

Assignment	5%
Mid-term exam:	40%
Final Exam:	<u>55%</u>
	100%

**Prerequisites:** MIE 1122 is designed for students having an undergraduate degree in Mechanical or Chemical Engineering. As well, **MIE 516 Combustion and Fuels is required as a prerequisite.** Alternatively, MIE 1123 Fundamentals of Combustion may be taken concurrently.

**Course Outline:**

DATE	TOPIC
January 10	Engine types & basic operation, Engine design & operating parameters, How performance is characterized (JBH Chs. 1&2).
January 17	Engine cycles (JBH 5.1-5.4, 5.5.3, 5.8).
January 24	Experimental methods (Notes + JBH 4.9).
January 31	Gas exchange process (JBH 6.1-6.5, 8.1-8.4, notes).
February 7	Spark ignition engine combustion and emissions (JBH, parts of chapters 9 & 11; notes).
February 14	<b>Midterm Exam</b>
February 21	<b>Reading Week</b> (No class)
February 28	Diesel engine combustion and emissions (JBH, parts of chapters 10 & 11; notes).
March 7	Advanced combustion concepts (Notes)
March 14	Heat transfer in engines (JBH, Chapter 12).
March 21	Engine friction and lubrication (JBH, Chapter 13)
March 29	Engine operating characteristics; Trends in engine design (JBH 15.1-15.3, 15.5, 15.6.1-15.6.2, notes).
April 4	<b>Final exam</b>

## Online Help

Do not send questions about course content by e-mail. Course content questions should be posted on either of two forums:

- A discussion board will be maintained on Quercus for questions.
- Third party software Piazza will also be used to answer questions. Some privacy concerns have been raised about Piazza. The University has prepared the following statement for students regarding use of Piazza:
  - ✓ *Be sure to read Piazza's Privacy Policy and Terms of Use carefully.*
  - ✓ *Take time to understand and be comfortable with what they say.*
  - ✓ *They provide for substantial sharing and disclosure of your personal information held by Piazza, which affects your privacy.*
  - ✓ ***If you decide to participate in Piazza, only provide content that you are comfortable sharing under the terms of the Privacy Policy and Terms of Use.***
- If you choose to use Piazza, you will need to sign up for it: ([link to be determined](#)); details are provided on the MIE 1122 Quercus Site. You do not need to provide any private information on the Piazza site and no work is submitted there.
- Once again, if you are uncomfortable signing up for Piazza, then questions can be posted to the discussion board on Quercus.
- Students are encouraged to actively participate in one of the online forums by asking and answering questions. Students are expected to communicate in a respectful manner with each other and with the course staff much like in a classroom. An online environment is no excuse for unprofessional conduct.

## References:

*Introduction to Internal Combustion Engines*, 4th Ed.

Richard Stone, SAE, (2012)

*Internal Combustion Engines: Applied Thermosciences*, 3rd Ed

Colin R. Ferguson and Allan T. Kirkpatrick, John Wiley & Sons, 2014.

*Understanding Automotive Electronics*, Seventh Ed. (2012)

William B. Ribbens and Norman P. Mansour.