

MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 444: Combustion Engine Design (4) Elective

Course Description: (2019-20 Catalog)	Application of design parameters to the various engine cycles. Aspects of combustion processes. Emission regulation effects on engine design. Static and dynamic loading. 3 lectures, 1 laboratory.
Prerequisite Courses:	ME 303, ME 347, ME 350
Prerequisites by Topic:	Thermal Engineering; Heat Transfer; Fluid Mechanics
Textbook: (and/or other required material)	<u>Internal Combustion Engines</u> , by C. Ferguson & A. Kirkpatrick, Wiley, 2001
References:	<u>Internal Combustion Engine Fundamentals</u> , by LB. Heywood, McGraw Hill, 1988 <u>Engines - An Introduction</u> , by J. Lumley, Cambridge University Press, 1999
Course Coordinator/Instructor:	Patrick Lemieux, Professor of Mechanical Engineering
Course Learning Outcomes:	1. Understand and predict the performance of various engine platforms, and be able to specify a solution to a given engine application problem. 2. Demonstrate the ability to analyze and predict products of combustion of internal combustion engines operating under specified conditions. 3. Modify or redesign existing engine designs to affect performance in a predictable and verifiable way.
Relationship of Course to Mechanical Engineering Student Outcomes:	SO 1: Mastered (M) SO 2: Mastered (M) SO 3: SO 4: SO 5: Mastered (M) SO 6: Mastered (M) SO 7:

Topics Covered:

1. The lectures include units on engine performance, similitude, cycles, modeling, fuels, combustion, emissions, engine mechanics, supercharging, and heat transfer in engines.
2. The laboratory component includes tests to measure the effect on performance of various engines parameters, including spark timing, Fuel Pulse Width, water injection, compression ratio, and turbocharger intercooling.

Laboratory Projects:

1. Megatech II Optical Engine Performance Analysis.
2. CFR (Cooperative Fuel Research) Performance Analysis.
3. CFR Emissions Analysis
4. Perkins Diesel Engine intercooler effectiveness.
5. JFS-100 Gas Turbine Performance

Class/Lab Schedule:

Three 50-minute lectures per Week, one 180-minute lab every 2 weeks.

Contribution of Course to Meeting the Professional Component:

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|---|-------------------|
| (a) College-level mathematics and basic sciences: | 0 Credits |
| (b) Engineering Topics:
Design? | 4 Credits
Yes. |
| (c) General Education: | 0 Credits |
| (d) other: | 0 Credits |

Prepared by: Chris Pascual

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