

1. EM461 Internal Combustion Engines

2. Credit Hours (3)/Contact Hours (4)

3. Course Director – Jim Cowart

4. Piston Power Course Notes by Caton, Cowart and Hamilton

5. Specific course information

- a. To develop both a fundamental and applied understanding of reciprocating internal-combustion engine design and operation through lectures, case studies and weekly laboratory activities.
- b. Text-Class Notes: Caton, Cowart & Hamilton, Piston Power.
- c. Please bring your calculator to every class period.

6. Educational objectives for the course

- a. Analyze engine performance data (e.g. torque, power, BMEP, volumetric efficiency, thermal efficiency and specific fuel consumption).
- b. Quantify various design parameters and their effect on engine performance (e.g. compression ratio, spark or injection timing, air-to-fuel ratio effects)
- c. Identify optimal engine parameters with respect to efficiency and emissions (e.g. fuel and spark controls).
- d. Identify engine losses and areas in which engines may be improved (e.g. pumping, thermal, friction).
- e. Quantify various fuel effects on engine performance (e.g. energy density, air-fuel ratio, etc.).

7. Specific program outcomes addressed by this course

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Reinforced	X		X		X	X	
Mastered							

8. Brief list of topics to be covered

-Introduction: Ford T and VW Jetta (Chapters 1 & 2)

-Ideal and Fuel/Air Cycles, Engine Metrics (Chapter 4)

- Fuel, Air and Combustion (Chapter 3)
- Combustion and Fuels (Chapter 5)
- Gasoline Engines (Chapter 6)
- Diesel Engines (Chapter 7)
- Solidworks engine design with focus on valve timing
- Yanmar Diesel Engine Teardown, Measurements, Rebuild and Test (groups of two/engine)
- Technical Engine Presentation (groups of two)