

## ME 4630 Internal Combustion Engines

<b>2007 Catalog Data:</b>	ME 4630. Internal Combustion Engines. Lec. 3. Credit 3. Prerequisites: ME 3220, ME 3710, ME 3720. Ideal fuel/air cycles, heat loss, friction, combustion and detonation, carburetion and fuel injection, air flow, normal overall performance, extreme performance. [Elective Course]
<b>Prerequisites by Topic:</b>	1. Thermodynamics - first law, air standard cycle analysis, combustion 2. Fluid mechanics - continuity equation, Bernoulli's equation 3. Heat transfer - conduction, convection, radiation
<b>Textbook and Resources:</b>	<u>Engineering Fundamentals of the Internal Combustion Engine</u> , W.W. Pulkrabek
<b>Course Objectives:</b>	The purpose of this course is to apply fundamental engineering principles to the analysis of internal combustion engines. It is desired to develop a working understanding of the operation of an internal combustion piston engine, and to learn the effects of operating conditions on its performance. Engine models based on fuel/air cycles are compared to actual engine performance. The thermodynamics of combustion are considered. Carburetion and fuel injection are studied. The effects of air flow efficiency, heat loss, and friction on engine performance are considered.
<b>Course Topics:</b>	T1. Fundamental operating principles, four-stroke/ two-stroke engines ( 9%) T2. Ideal air standard cycles, thermal efficiency ( 9%) T3. Combustion chemistry and thermodynamics ( 7%) T4. Fuel/air mixtures, abnormal combustion, exhaust gas emissions (11%) T5. Induction and exhaust processes, valve timing, manifolds (11%) T6. Carburetors and fuel injection ( 9%) T7. Turbocharging/supercharging ( 7%) T8. Charge motion within cylinder ( 9%) T9. Combustion in SI/CI engines ( 9%) T10. Two stroke engine performance ( 7%) T11. Engine heat transfer ( 7%) T12. Friction and lubrication ( 5%)
<b>Class/Lab Schedule:</b>	Minimum student contact time – 2200 minutes
<b>Course Outcomes:</b>	Upon completion of this class, the student will be able to: C1. Apply fundamentals of thermodynamics, fluid mechanics, and heat transfer to analyze internal combustion engine operation. [a,e,k,l] C2. Evaluate processes relevant to internal combustion engine design, performance, efficiency, emissions, and fuel requirements. [a,c,e,f,h,j,k,l] C3. Interpret turbocharger/supercharger and engine performance maps. [a,b,e,k,l]
<b>Professional Component:</b>	This course illustrates how modern internal combustion engine design is influenced by realistic economic, environmental, and political constraints. Students will learn how engineering solutions have been employed to achieve such desired societal goals as reduced engine emissions, coupled with enhanced engine power and economy.
<b>Contribution of Course to Meeting the Professional Component:</b>	Math and Basic Science: General Education: Engineering: 3 credit hours Other:
<b>Relation to Program Objectives:</b>	This course uses fundamental principles of engineering to analyze internal combustion engine performance. The course is designed to assist in the application of engineering concepts and theory available from disparate sources to the solution of actual engineering problems.

**Course Coordinator:** Undergraduate Program Committee

**Prepared by:** S. Idem

**Date:** 1-15-08