

MECH 410N - Internal Combustion Engines

COURSE OUTLINE

1. INTRODUCTION

- 1.1. Engine configuration, 2 & 4 stroke engines, Mechanical design, examples.

2. SPARK-IGNITION ENGINES

- 2.1. Air-Standard & Fuel-Air Cycle analysis
- 2.2. Performance Criteria
- 2.3. SI Engine Combustion and Performance
- 2.4. Gas Exchange Processes
- 2.5. Forced Induction
- 2.6. IC Engine Modelling
- 2.7. Effects of Chemical Equilibrium on Engine Performance

3. DIESEL ENGINES

- 3.1. Diesel engine performance characteristics
- 3.2. The Limited Pressure Cycle
- 3.3. The fuel-air cycle with complete combustion
- 3.4. Turbocharged and compound Diesel engines
- 3.5. Diesel fuel injection and combustion processes

4. EXHAUST EMISSIONS & THEIR CONTROL

- 4.1. Exhaust emissions from SI and Diesel engines
- 4.2. NO_x formation in SI and Diesel engines
- 4.3. Hydrocarbon and soot emissions
- 4.4. Emission control techniques

5. ALTERNATIVE ENGINE DESIGN CONCEPTS

- 5.1. The Atkinson Cycle Engine
- 5.2. Direct-Injection Spark-Ignition Engines
- 5.3. The Partially-Stratified-Charge Engine
- 5.4. Homogeneous Charge Compression Ignition (HCCI) Engines

REFERENCES:

1. Heywood, J.B., "Internal Combustion Engine Fundamentals" McGraw Hill.
2. Taylor, C.F., "The Internal Combustion Engine in Theory & Practice", 2 vols., MIT Press.