AUTO 295: ENGINE DESIGN

Citrus College Course Outline of Record

Heading	Value
Effective Term:	Fall 2022
Credits:	4
Total Contact Hours:	72
Lecture Hours :	72
Lab Hours:	0
Hours Arranged:	0
Outside of Class Hours:	144
Strongly Recommended:	ENGL 101 and MATH 144 or higher.
Transferable to CSU:	Yes
Transferable to UC:	No
Grading Method:	Standard Letter, Pass/No Pass

Catalog Course Description

A course designed to teach engine design principles and analysis of cylinder heads, cylinder blocks, crankshafts, piston and rings, connecting rods, camshaft, valve train systems. The course will also cover the use of basic and advanced engine design formulas. 72 lecture hours.

Course Objectives

- demonstrate a basic knowledge of engine design history by investigating a given historical engine design developer provided by the instructor.
- choose the appropriate camshaft for a given engine design after comparing and contrasting various camshaft specifications.
- select the best cylinder block attributes for a given engine design by evaluating the various cylinder block design features.
- choose the best crankshaft for a given design after debating the advantages and disadvantages of the various crankshaft design features.
- evaluate various connecting rod length choices by calculating and comparing specific connecting rod ratios and design limitations using given formulas and design data.
- determine the appropriate connecting rod for a given engine design by comparing and contrasting various connecting rod design features.
- assess the effects of various design changes to piston inertia using a given formula and design data.
- determine the appropriate piston for a given engine design by comparing and contrasting various piston design elements.
- choose the appropriate ring package for a given engine design by debating the advantages and disadvantages of various piston ring designs.
- demonstrate a basic understanding of design concepts through a class discussion of various design purposes and possible ideals.
- classify engines using the appropriate categories to describe a given engine.
- compare basic engine design parameters by taking given specifications and computing results for specific engine dimensions and ratios.
- compare advanced engine design parameters by taking specific specifications and computing results for specific engine dimensions and ratios.
- demonstrate a basic understanding of metallurgy as it applies to engine design by providing specific information on one of the metals used in engine design and production.
- debate the advantages and disadvantages of various combustion chamber designs.
- compute cylinder head design parameters using given formulas and design data.
- choose the appropriate parts for a given engine design after debating the advantages and disadvantages of various cylinder head components.

Major Course Content

1. Engine theory of operation
   a. Nomenclature
   b. Four stroke principle
   c. Engine types
   d. Physical principles of engine operation
   e. Engine measurements and ratios
2. Engine construction and design
   a. Cylinder block
   b. Cylinder head
   c. Crankshaft
   d. Connecting rod
   e. Piston
   f. Piston rings
3. Engine internal component design
   a. Combustion chamber design
   b. Piston and rings
   c. Valve train components
   d. Camshaft
   e. Materials and coatings
4. Engine auxiliary system design
   a. Turbochargers
   b. Superchargers
   c. Lubrication systems
   d. Cooling systems

Suggested Reading Other Than Required Textbook

Internet research on newest engine design ideas. Magazine articles on engine design ideas.

Examples of Required Writing Assignments

Student opinion paper on the best engine design. Student final project engine design.

Examples of Outside Assignments

Read required materials Do research in department library or outside resources to complete opinion paper and research project.

Instruction Type(s)

Lecture, Online Education Lecture