

AMC 426/597 – AGRI POWER & ENERGY MANAGEMENT (3CR)

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COURSE DATES: Fridays, July 7th – August 6th 2014

SCHEDULE: Course will meet on Fridays from 8:00am — 5:00pm during the Summer II semester.

COURSE DESCRIPTION: A study of the principles and theories needed to comprehend and manage agricultural and environmental technology associated with machinery/equipment and energy systems. Reduction and synthesis of natural and applied science principles which involve mechanical, electrical, fluid power systems; the adjustments, fabrication, maintenance, repair and management of machines and equipment utilized in said systems; knowledge of entrepreneurship, communications, safety, service, planning, and regulation of technologies associated with agriculture and the environment. Prerequisites: AMC 315 and junior standing.

COURSE OBJECTIVES: Upon the completion of this course, students will be able to:

Identify engine components and explain the operation of two-stroke and four-stroke cycle, spark-ignition and compression engines.

Define and calculate the concepts of bore, stroke, compression ratio, and piston displacement for given internal combustion engines.

Disassemble and assemble a small gasoline engine such that all parts are assembled correctly and the engine runs and accelerates without hesitation.

Operate precision measurement instruments (feeler gauge, wire gauge, telescoping gauge, dial calipers, and micrometers).

Explain the extent of fluid power use in current society and provide several specific examples.

Explain the symbols used to designate components in fluid power circuit diagrams.

Identify and explain the parts of circuit diagrams typically used with fluid power equipment.

597 STUDENTS ADDITIONAL OBJECTIVES:

Explain the proper methods of engine run-in using an engine dynamometer.

Define and calculate the concepts of bore, stroke, compression ratio, and piston displacement multi-cylinder combustion engines.

REQUIRED MATERIALS:

- All reading material will be available online via the course website
- Students must acquire and maintain an active Leo account
- Safety Glasses and appropriate protective clothing.

Textbook/References:

Roth, A. C. (2009). *Small Gas Engines: fundamentals, service, troubleshooting, repair, and applications*. (9th edition). Tinley Park, Illinois: The Goodheart-Wilcox Company, Inc.
ISBN: 978-1-59070-970-2

Daines, J. R. (2013). *Fluid power: Hydraulics and pneumatics*. (2nd edition). Tinley Park, Illinois: The Goodheart-Wilcox Company, Inc.
ISBN: 978-1-0525-931-4

COURSE GRADING AND ASSIGNMENTS: Your grade for this course will be derived from the quality of your performance on a variety of indicators.

Module	Number	Points	Total Points
Lab Activities	4	100	400
Midterm	1	100	100
Final Exam	1	100	100
Final Practical (Engine Run)	1	100	100
AMC 426 Total			700
Dynamometer Practical (597 ONLY)	1	200	200
AMC 597 Total			900

$$\text{Your grade} = \frac{\text{Total Points Earned}}{\text{Total Potential Points}} = \frac{\quad}{500 \text{ (or 900)}} = \quad\%$$

A = 90% or higher; **B** = 80-89%; **C** = 70-79%; **D** = 60-69%; **F** = under 60%

AMC 597 Graduate Student Practical (200 points): A dynamometer (“dyno”) is a measuring tool that measures the mechanical power of an engine. The dyno applies a resistive load to the operating engine. Instruments connected to the dyno measure this load (torque) and when recorded relative to engine speed provides the user with valuable diagnostic and performance information. As a graduate student in AMC 597, you will be required to operate the small engine dyno that will optimize your engine’s performance. In order to received total points for the assignment you will print and report the results in a 2-page write-up. The following items must be presented and discussed in your report (among other things): Engine RPM, Torque, Horsepower, Fuel Flow, and Mechanical Energy.

UNIVERSITY SPECIFIC PROCEDURES:

ADA Statement

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact:

Office of Student Disability Resources and Services
Texas A&M University-Commerce
Gee Library 132
Phone (903) 886-5150 or (903) 886-5835
Fax (903) 468-8148
StudentDisabilityServices@tamu-commerce.edu
Student Disability Resources & Services

Attendance

Attendance is mandatory and will be checked at each session. For further information and policy concerning excused absences, see the University's guidelines. The instructor should be notified before the class period for an excused absence. The opportunity to make up assignments as a result of an unexcused absence will be at the discretion of the instructor.

COURSE SCHEDULE (NOTE: SUBJECT TO CHANGE):

Week	Topics	Requirements & Assignments
Week 1 07/11/14	<p><u>Hydraulics</u></p> <p>Introduction to course</p> <p>Introduction to Fluid Power</p> <p>Fluid Power Standards and Symbols</p> <p>Actuators & Accumulators</p>	<p>Read PowerPoints & Instructor provided material</p> <p><u>Lab 1: Fluid Power Trainer Schematics (PJCC)</u></p>
Week 2 07/18/14	<p><u>Small Gasoline Engines*</u></p> <p>Introduction to Engine systems</p> <p>Two-Cycle and Four-Cycle Engines</p> <p>Carburation</p> <p>Review for Midterm</p>	<p>Read PowerPoints & Instructor provided material</p> <p><u>Lab 2: Engine Disassembly</u></p> <p>a. Tools and Measuring Instruments b. Engine Test Run c. Carburetor Removal/Teardown d. Governor Systems</p>
Week 3 07/25/14	<p><u>Small Gasoline Engines* (2)</u></p> <p>Ignition System</p> <p>Cooling & Lubrication Systems</p> <p>Midterm Exam</p>	<p>Read PowerPoints & Instructor provided material</p> <p><u>Lab 3: Engine Reassembly</u></p> <p>a. Cylinder Head b. Ignition System c. Lubricating System</p>
Week 4 08/01/14	<p><u>Electrical Motors & Other Topics:</u></p> <p>Single-Phase Motors</p> <p>Direct Current Motors</p> <p>Three-Phase Motors</p> <p>Motor Nameplate Data</p> <p>Motor Selection</p> <p>Final Exam</p>	<p>Read PowerPoints & Instructor provided material</p> <p><u>Lab 4: Electrical Motor Disassembly/Reassembly</u></p> <p>a. Motor Nameplate data</p> <p>AMC 597 Dynamometer Run</p>

* Note: AMC 597 students will be assigned to multi-cylinder engines only.