ABE 5152 Course Syllabus
Advanced Fluid Power Circuits and Control

Instructor: Dr. Tom Burks
Frazier Rogers Hall, #225
Phone: 352-392-1864 ext. 225
e-mail: ttburks@ifas.ufl.edu

Teaching Assistant: TBD
Frazier Rogers Hall,
Phone: 352-392-1864
e-mail:

Credits: 3 Credits

Description: Engineering analysis, design and experimentation of electro-hydraulic circuits and systems. Including the design of hydraulic circuits, fluid power system components, hydraulic actuator analysis, servo and proportional valve performance, and electro-hydraulic control theory and applications.

Prerequisites: Senior level undergraduate standing with EGM3400, EGN3353C completed. Graduate Students are encouraged but not required to take EML5311 concurrently.

Objectives: To give students a rigorous background in the theoretical and applied concepts associated with development of fluid power control and systems design. As a result students should be able to develop theoretical control models, as well as build practical fluid power systems.

Course Texts:
Fluid Power Circuits and Controls, John Cundiff, 2002, CRC Press (Recommended)
Hydraulic Control Systems, Noah Manring, 2005, John Wiley and Sons, Inc. (Recommended)

Reference Texts:

Course Meeting
Lecture: Tuesday 4th and 5th period and Thursday, 4th period in room 211

Grading Criteria:
Homework 40%
Mid-term Exam 20%
Term Design Project and Presentation 20%
Final Exam (non-comprehensive) 20%

This course is a dual listed undergraduate and graduate level course. The two classes will be taught together, but the degree of difficulty of the graduate level class will be more advanced requiring a higher level of mathematics and engineering control concepts.
• Homework will be assigned from the textbooks. Independent work is required, yet student interaction is permitted.
• There will be two mid-term exams one in March and the other at the end of the semester.
• The student will complete a class design project using Automation Studio and provide an in class presentation of the project concepts.

Honesty Policy – All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a UF student and to be honest in all work submitted and exams taken in this course and all others.

Accommodation for Students with Disabilities – Students Requesting classroom accommodation must first register with the Dean of Students Office. That office will provide the student with documentation that he/she must provide to the course instructor when requesting accommodation.

UF Counseling Services – Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:
- University Counseling Center, 301 Peabody Hall, 392-1575, Personal and Career Counseling.
- SHCC Mental Health, Student Health Care Center, 392-1171, Personal and Counseling.
- Center for Sexual Assault/Abuse Recovery and Education (CARE), Student Health Care Center, 392-1161, sexual assault counseling.
- Career Resource Center, Reitz Union, 392-1601, career development assistance and counseling.

Software Use – All faculty, staff and student of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Typical Course Topics (as time permits)

Topic 1: Fluid Power Basics (CH 1 & CH 2: Cundiff)
Topic 2: Fluid Properties (CH 1: Manring)
Topic 3: Fluid Mechanics (CH 2: Manring)
Topic 4: Dynamic Systems and Controls (CH 3: Manring)
Topic 5: Pressure Control (CH 3: Cundiff)
Topic 6: Creation and Control of Fluid Flow (CH 4: Cundiff)
Topic 7: Hydraulic Control Valve Dynamics (CH 4: Manring)
Topic 8: Hydraulic Pump Dynamics (CH 5: Manring)
Topic 9: Rotary Actuators and Linear Actuators (Cundiff/Manring)
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<td>Pump Controlled Hydraulic Systems (CH 8: Manring)</td>
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<td>Electro-Hydraulic Servo Valves (CH 11: Cundiff, CH 7: Merritt)</td>
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<td>Non-linearities in Control Systems (CH 10: Merritt)</td>
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<td>Topic 18:</td>
<td>Modeling Fluid Power Circuits using Automation Studio</td>
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