Harford Community College
Science, Technology, Engineering and Mathematics Division
ENGR 204 Basic Circuit Analysis – 4 credits
Fall 2011 Syllabus

Instructor: Peter H. Anderson
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Office Hours: Will discuss with students.
Homepage: http://www.phanderson.com/harford/
Meeting Location / Time, Lecture: A 254 [M, W 4:00 – 5:20]
Meeting Location / Time, Lab: A 230 [M, W 5:35 – 7:05]

Catalog Course Description: This course is intended for electrical engineering majors. It presents the fundamentals of circuit analysis and introduces the students to basic electronic equipment and measurement techniques, including simulation, construction, and testing of basic analog circuits. Topics include basic circuit elements, such as resistors, capacitors, inductors, sources, transformers, and operational amplifiers; V-I laws for RLC elements; response of RC, LC and RLC circuits; steady state analysis of DC and AC circuits. Students apply Ohm's Law and Kirchoff's Laws, apply analysis techniques including phasor, nodal and mesh analysis and Thevenin and Norton's Theorems, and perform transient analysis for first and second-order circuits. This course includes a design project and presentation. *This course meets 45 lecture/discussion hours and 45 laboratory hours. Prerequisites: MATH 204 and co-or prerequisite PHYS 204.* Course fee.

Required Textbooks:
Text: Dorf and Svoboda, 8th Edition, Wiley, 2010. Note that editions 6 and 7 may be used.
Lab Manual: Yannis Tsividis, "A First Lab in Circuits and Electronics, Wiley, 2002. Note that any earlier edition may be used.

Student Learning Objectives and Academic Outcomes: Upon the successful completion of this course, the students should be able to:

1. Identify and describe common circuit components and configurations. (**Academic outcomes supported by this objective:** Communication, Science and Technology).
2. Analyze linear AC/DC circuits using techniques such as superposition and source transforms. **Academic outcomes supported by this objective:** Critical thinking, Science and Technology, Computational Skills).
3. Identify and apply basic circuit analysis techniques such as Ohm's Law, Kirchoff's Laws, Nodal and Mesh Analysis, Thevenin and Norton equivalents, Superposition, Source Transformation.

(**Academic outcomes supported by this objective:** Critical thinking, Science and Technology, Computational Skills).

4. Identify, formulate and solve basic engineering design problems involving linear electric circuits. (**Academic outcomes supported by this objective:** Critical thinking, Science and Technology, Computational Skills).
5. Describe the concepts or sinusoids and phasors and the phasor relationships for circuit elements. (**Academic outcomes supported by this objective:** Critical thinking, Science and Technology, Communication, Computational Skills).
6. Describe the transient circuit and solve for the complete response of RL, RC and RLC circuits. (**Academic outcomes supported by this objective**: Critical thinking, Science and Technology, Communication, Computational Skills).
7. Collaborate with other students in the laboratory to complete and present a group project. (**Academic outcomes supported by this objective:** Interpersonal Skills, Personal and Self-Management Skills, Communications, Science and Technology).
8. Use modern hardware and software engineering tools to design, complete, analyze and interpret lab experiments. (**Academic outcomes supported by this objective:** Critical thinking, Science and Technology, Computational Skills).

Assessment Methods:

Exams: Three exams plus a final exam. Details will be reviewed prior to the exam. The exams should require only an hour. However, the combined time allocated for lecture and for laboratory may be used and this will provide some three full hours. The Final will be comprehensive and will be held in the room and at the time scheduled by the College. One 8-1/2 by 11 sheet of notes (all six sides) may be used on all quizzes, exams and the final. There will be no makeup exams.

Quizzes: A short written quiz will be administered during the laboratory period. This will usually be related to material covered in lecture. A brief oral quiz of the laboratory material will be given in a conversational manner as each student group finishes their work. There will be no makeup quizzes.

Assignments: Assignments will be given weekly and they may be done alone or responsibly in a small group. Be careful. What might look trivial in a group setting may take on a whole different perspective when you are confronting similar problems on an exam. I suggest trying to work the problems alone and call on others in the class only when you get stuck. Late work will not be accepted.

Grading:

Assignments – 25%.
Quizzes – 25%
Exams – 30% G
Final Exam – 20%

Course Policies: HCC students are bound by the academic policies outlined in the most current HCC Catalog. It is the student's responsibility to review these policies prior to the start of the semester. Students will be familiar with and adhere to the policies and sanctions governing student conduct as written in the HCC Catalog. The HCC Catalog may be accessed online at: http://www.harford.edu/Catalog/

Attendance: Attendance is extremely important. You are allowed 2 absences per semester with no penalty. Following the 2 allowed absences, every two unexcused absence will lower your final course grade by 1/3 of a letter grade.

Academic Dishonesty:

Note that you may consult other students in performing lecture assignments. If you do, please note this. But, in the end, it is your work and you should understand it. In the lab, you are expected to work with others, but here again, you should understand it.

On quizzes, exams and the final, one 8-1/2 by 11 sheet of notes may be used. Any copying, use of electronic communication or similar is academic dishonesty and the student will receive a zero on the quiz, exam or final and may, at the discretion of the instructor, receive a grade of 'F' for the course.

Student Conduct: Students will be familiar with and adhere to the policies and sanctions governing student conduct as discussed in the HCC Catalog.

Be professional. Place your phone in a vibrate mode and if you receive a critical call, quietly leave the room. Do not text in class. Computers are an invaluable tool in engineering and in your education and they will be used in this course. But, there are appropriate times for an open lap top and during lecture is usually not an appropriate time to be surfing the web or similar.

Disability Support Services: HCC is committed to serving students who have documented physical, learning, psychological, or other disabilities. Students who have a disability are responsible for contacting Disability Support Services at 443-412-2402 to discuss their needs for accommodations. All information shared with Disability Support Services will be held in confidence.

Syllabus Modification: The instructor reserves the right to modify and/or change the course syllabus with reasonable notification to students.

Course Content Schedule
Lecture:
1 – Ch 1 – electric circuits, current, voltage, power and energy, circuit analysis.
2 – Ch 2 – linear and nonlinear, active and passive elements, independent and dependent sources, transducers, switches.
3 – Ch 2, 3 – dependent sources, transducers, switches, Kirchoff's Laws, series resistors, voltage division.

4 – Ch 3 – parallel resistors, current division, series voltage sources, parallel current sources.
5 – Exam #1 and review
6 – Ch 3, 4 - analyzing resistive circuits, mesh and nodal analysis, solving simultaneous equations using Excel.
7 – Ch 4 – mesh and nodal analysis.
8 – Ch 5 – source transformations, superposition.
9 – Ch 5 – Thevenin, Norton, maximum power transform.
10 - Exam #2 and review.
11 – Ch 6 - operational amplifiers.
12 – Ch 7 – inductors and capacitors.
13 – Ch 8 – step response, RL and RC.
14 – Exam #3 and review.
15 – Ch 10 – sinusoidal analysis.
16 – Ch 10 – sinusoidal analysis.

Laboratory: (This may be revised).
1 - Safety, good lab practices, ground connections.
2 – Measuring DC voltages and currents.
3 – DC circuits, resistors and resistive sensors.
4 – Generating, observing and hearing time-varying signals.
5 – Op amps and comparators.
6 – Amplifier design using op amps; a sound system.
7 – RC circuit transients.
8 – Filters, frequency response and tone control.
9 – Diodes.
10 – Modulation.
11 – MOSFET characteristics and applications.
12 through 16 - Designs using the Arduino Processor.