ELEC 3060 – WIRELESS DESIGN LAB
(Required for WIRE, WIRS)

Bulletin Data: ELEC 3060 WIRELESS DESIGN LAB (1) LAB 3. Pr., ELEC 3400. Laboratory experiments geared towards understanding the implementation and testing of components used in wireless communication systems.

Textbook: Communication Systems Modelling with TIMS, Emona Instruments, Sydney Australia, provided in lab

Reference: T.I.M.S. System User’s Guides provided in lab.

Coordinators: Dr. Thaddeus Roppel and Dr. Lloyd Riggs

Course Goals:
1. To understand key components of analog and digital wireless voice transmission
2. To understand key components of wireless digital data transmission
3. To be able to design key components of a wireless transceiver
4. To be able to communicate experimental results orally and in writing

Prerequisites by topic:
1. Communications Systems
2. Electromagnetic Waves

Topics:

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<th>Week</th>
<th>Experiments</th>
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<tr>
<td>1</td>
<td>Exp 1 – Intro to modeling with TIMS; Exp 2 – Modeling an equation; Exp 3 – Amplitude Modulation and Envelopes</td>
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<td>Exp 4 – Sampling theorem; Exp 5 – TimeDivision Multiplexing (TDM)</td>
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<td>Exp 6 – Intro to FM using VCO; Exp 7 – FM demodulation with the PLL</td>
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<td>Exp 8 – Pseudo Random Binary Sequence (PRBS) Generation; Exp 9 – Eye Patterns</td>
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<td>Exp 10 – Noisy Channel Model; Exp 11 – Detection with the Decision Maker</td>
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<td>6</td>
<td>Exp 12 – Line Coding; Exp 13 – Amplitude Shift Keying (ASK); Exp 14 – Binary Phase Shift Keying (BPSK)</td>
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<td>7</td>
<td>Exp 15 – Frequency Shift Keying with PLL (FSK); Exp 16 – Sampling with Sample and Hold</td>
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<td>Exp 17 – PCM Encoding and Decoding; Exp 18 – Block Coding and Decoding</td>
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<td>Exp 19 – Bit Error Rate (BER) Measurement in the Noisy Channel; Project Proposals Due</td>
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<td>10</td>
<td>Exp 20 – Bit Clock Regeneration; Exp 21 – DSSS and CDMA; Proposals returned</td>
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<td>11-12</td>
<td>Final Design Projects</td>
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<td>Final Project Presentations</td>
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Typical method for evaluating student performance:

- Lab Reports: 50%
- Quizzes: 20%
- Design project oral presentation: 15%
- Design project written report: 15%

Homework: Assignments will consist of reading in preparation for each week’s experiments, and preparing a lab report to be submitted the week following the experiments.

Lab Reports: Each team will submit one lab report covering all experiments performed in the lab. The report will be due in hardcopy as you come into lab the following week. Reports will not be accepted by email. Late reports: Reports submitted later than the start of class will be docked 50% immediately, then an additional 25% for each 24 hours past the due time. Plan ahead. “The printer wasn’t working” is NOT a valid excuse. If you are submitting a report late, it must be handed to a departmental secretary in 200 Broun Hall, who will then place a time stamp on it and deliver it to your GTA. You must tell her who your GTA is when you submit it.
Class attendance is required. If you miss your section meeting for any reason, you must schedule a makeup with your GTA. Typically this will occur during the designated makeup session near the end of the semester. Failure to make up any one experiment will result in a course grade reduction of 33% (automatic D). Failure to makeup two experiments will result in automatic failure. You may not show up to another section meeting the same week without approval from both GTA’s involved.

Quizzes will be given each week. They may cover any material from previous experiments, as well as pre-lab.

Accommodations: Students who need accommodations are asked to arrange a meeting during office hours the first week of classes, or as soon as possible if accommodations are needed immediately. If you have a conflict with the instructor’s office hours, an alternate time can be arranged. To set up this meeting, please contact the instructor by E-mail. Bring a copy of your Accommodation Memo and an Instructor Verification Form to the meeting. If you do not have an Accommodation Memo but need accommodations, make an appointment with The Program for Students with Disabilities, 1244 Haley Center, 844-2096 (V/TT).

Academic Honesty Policy: All portions of the Auburn University student academic honesty code (Title XII) found in the Tiger Cub will apply to this class. All academic honesty violations or alleged violations of the SGA Code of Laws will be reported to the Office of the Provost, which will then refer the case to the Academic Honesty Committee.

Contribution of course to meeting the professional component:

Engineering science: 0.2 credit or 20 %
Engineering design: 0.8 credit or 80 %

Primary student outcomes related to this course:
Graduates will have achieved and demonstrated
(a) an ability to apply knowledge of mathematics, science, and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multidisciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(i) a recognition of the need for, and an ability to engage in life-long learning
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Prepared by: Dr. Thaddeus Roppel and Dr. Lloyd Riggs      Date: 2/8/12