ET 437b – Wireless Communications Systems

SYLLABUS

Instructor: D. T. Williams
Office: D1111
Office Hours: MWF 11-2
Phone: 453-7820 (desk) 536-3396 (Technology Department)
eMail: dtw322@siu.edu

Text: Beasley, Miller 9th

Goal: To introduce students to radio frequency signals, transmitters, receivers, and types of modulation and to data communications. To enable the students to gain an understanding of the material for the practical application of the aforementioned topics.

Topics including, but not limited to:
- RF signal analysis
- Oscillators
- AM receivers
- Single sideband systems
- FM transmitters
- Digital modulation techniques
- RS232 standards

Amplitude modulation
RF amplifiers
Tuned RF receiver
PLL synthesizer
FM receivers
UARTs
Direct Conversion receivers

AM transmitters
RF modulators
Super heterodyne receiver
DDS synthesizer
Digital data
Error detection and correction
Super regenerative receivers

Laboratory exercises including, but not limited to:

PBL design of a WWV receiver

Project: WWV receiver, design, construction, demonstration, presentation, and report

Course grade:
- Homework: 15%
- Lab work: 25%
- Class participation: 15%
- Receiver project: 30%
- Exams: 15%

Scale:
- 90-100% A;
- 80-89% B;
- 70-79% C;
- 60-69 % D;
- <60% F

Exam Policy: There will be NO make-up exams; students who must miss the mid-term will have their final count twice.

Attendance policy: Final grade will be reduced 2% per absence
At the end of the course, the student should be able to:

- Correctly use mathematical relationships involved in RF signal analysis
- Discuss the advantages and disadvantages of various types of modulation
- Explain how an AM signal is created and how the operation of an AM modulator circuit
- Discuss the advantages and disadvantages of various types of oscillator circuits
- Explain how an RF amplifier works and why one would be needed
- Draw and explain a block diagram of an AM transmitter
- Explain how an AM signal detector works
- Draw and explain block diagrams for super regenerative, direct conversion, TRF, and super heterodyne AM receivers.
- Explain the difference between analog and digital data and how the modulation systems are different
- Explain the operation of a UART
- Describe what the RS232 standard specifies and what it guarantees
- Effectively use basic laboratory instrumentation in the design and construction of AM receiver functional blocks
- Design and construct a working RF receiver
1. Course number and name

2. Credits and contact hours
   4 Credits, 5 Contact hours: Lecture 3hrs/week, Lab 2 hrs/week

3. Instructor
   David T Williams

4. Text book, title, author and year
   a. Supplemental materials

5. Specific course information
   a. Course Catalog Description
      This course introduces students to radio frequency signals, transmitters, receivers, and various types of modulation used in wireless communications. It covers RF signal analysis and modulation theory. Students study theory, design and application of circuit blocks. Laboratory design exercises produce functional communication system blocks that are assembled into a high frequency receiver for demonstration.

   b. Prerequisite/Co-requisite:
      Prerequisite: ET 403A and ET 437A

   c. Required/Elective/Selected Elective
      Required

6. Specific goals for the course
   a. Specific outcomes of instruction
      a. Correctly use mathematical relationships involved in RF signal analysis
      b. Discuss the advantages and disadvantages of various types of modulation
      c. Explain how an AM signal is created and how the operation of an AM modulator circuit
      d. Discuss the advantages and disadvantages of various types of oscillator circuits
      e. Explain how an RF amplifier works and why one would be needed
      f. Draw and explain a block diagram of an AM transmitter
      g. Explain how an AM signal detector works
      h. Draw and explain block diagrams for super regenerative, direct conversion, TRF, and super heterodyne AM receivers.
      i. Explain the difference between analog and digital data and how the modulation systems are different
      j. Explain the operation of a UART
      k. Describe what the RS232 standard specifies and what it guarantees
      l. Effectively use basic laboratory instrumentation in the design and construction of AM receiver functional blocks
Syllabus Attachment
Spring 2014

IMPORTANT DATES *

Semester Class Begins .................................................. 01/13/2014
Last day to add a class (without instructor permission): .......... 01/24/2014
Last day to withdraw completely and receive a 100% refund: .. 01/26/2014
Last day to drop a course using SalukiNet: .......................... 03/23/2014
Last day to file diploma application (for name to appear in Commencement program): ............................................. 03/28/2014
Final examinations .......................................................... 5/5 – 5/9/2014

* Note: For outreach, online, and short course drop/add dates, visit Registrar’s Academic webpage http://registrar.siu.edu/

SPRING SEMESTER HOLIDAYS
Martin Luther King, Jr.’s Birthday 01/20/2014
Spring Vacation 03/08—03/16/2014

WITHDRAWAL POLICY – Undergraduate only

Students who officially register for a session may not withdraw merely by the stopping of attendance. An official withdrawal form needs to be initiated by the student and processed by the University. For the proper procedures to follow when dropping courses and when withdrawing from the University, please visit http://registrar.siu.edu/pdf/ugradcatalog1314.pdf

INCOMPLETE POLICY – Undergraduate only

An INC is assigned when, for reasons beyond their control, students engaged in passing work are unable to complete all class assignments. An INC must be changed to a completed grade within one semester following the term in which the course was taken, or graduation, whichever occurs first. Should the student fail to complete the course within the time period designated, that is, by no later than the end of the semester following the term in which the course was taken, or graduation, whichever occurs first, the incomplete will be converted to a grade of F and the grade will be computed in the student’s grade point average. For more information please visit: http://registrar.siu.edu/grades/incomplete.html

REPEAT POLICY

An undergraduate student may, for the purpose of raising a grade, enroll in a course for credit no more than two times (two total enrollments) unless otherwise noted in the course description. For students receiving a letter grade of A, B, C, D, or F, the course repetition must occur at Southern Illinois University Carbondale. Only the most recent (last) grade will be calculated in the overall GPA and count toward hours earned. See full policy at http://registrar.siu.edu/pdf/ugradcatalog1314.pdf

GRADUATE POLICIES

Graduate policies often vary from Undergraduate policies. To view the applicable policies for graduate students, please visit http://gradschool.siu.edu/about-us/grad-catalog/index.html

DISABILITY POLICY

Disability Support Services provides the required academic and programmatic support services to students with permanent and temporary disabilities. DSS provides centralized coordination and referral services. To utilize DSS services, students must come to the DSS to open cases. The process involves interviews, reviews of student-supplied documentation, and completion of Disability Accommodation Agreements. http://disabilityservices.siu.edu/

STUDENT CONDUCT CODE

http://policies.siu.edu/other_policies/chapter2/conduct.html

SALUKI CARES

The purpose of Saluki Cares is to develop, facilitate and coordinate a university-wide program of care and support for students in any type of distress—physical, emotional, financial, or personal. By working closely with faculty, staff, students and their families, SIU will continue to display a culture of care and demonstrate to our students and their families that they are an important part of the community. For Information on Saluki Cares: (618) 453-5714, or siucares@siu.edu, http://salukicares.siu.edu/index.html

EMERGENCY PROCEDURES

Southern Illinois University Carbondale is committed to providing a safe and healthy environment for study and work. We ask that you become familiar with the SIU Emergency Response Plan and Building Emergency Response Team (BERT) programs. Emergency response information is available on posters in buildings on campus, available on BERT’s website at www.bert.siu.edu, Department of Safety’s website at www.dps.siu.edu (disaster drop down) and the Emergency Response Guideline pamphlet. Instructors will provide guidance and direction to students in the classroom in the event of an emergency affecting your location. It is important that you follow these instructions and stay with your instructor during an evacuation or sheltering emergency.

INCLUSIVE EXCELLENCE

SIU contains people from all walks of life, from many different cultures and sub-cultures, and representing all strata of society, nationalities, ethnicities, lifestyles, and affiliations. Learning from and working with people who differ is an important part of education as well an essential preparation for any career. For more information please visit: http://www.inclusiveexcellence.siu.edu/

MORRIS LIBRARY HOURS

http://www.lib.siu.edu/about

LEARNING AND SUPPORT SERVICES

Help is within reach. Learning support services offers free tutoring on campus and math labs. To find more information please visit the Center for Learning and Support Services website:
Tutoring: http://tutoring.siu.edu/
Math Labs http://tutoring.siu.edu/math_tutoring/index.html

WRITING CENTER

The Writing Center offers free tutoring services to all SIU students and faculty. To find a Center or Schedule an appointment please visit http://write.siu.edu/

AFFIRMATIVE ACTION & EQUAL OPPORTUNITY

Our office’s main focus is to ensure that the university complies with federal and state equity policies and handles reporting and investigating of discrimination cases. For more information visit: http://diversity.siu.edu/

Additional Resources Available:

SALUKINET: https://salukinet.siu.edu/cp/home/displaylogin

ADVISEMENT: http://advisement.siu.edu/

PROVOST & VICE CHANCELLOR: http://pvcaa.siu.edu/

SIU ONLINE: http://online.siu.edu/

1 Southern Illinois University Carbondale. (2013). Pathways to Excellence: A Strategic Plan
### SPRING 2014
### FINAL EXAMINATION SCHEDULE

7. Other classes (not those for 1 credit) should hold their final exams as follows:

**First Line of Schedule Listing Shows:**

<table>
<thead>
<tr>
<th>Meeting Time</th>
<th>Scheduled</th>
<th>Date of Exam</th>
<th>Exam Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starts At:</td>
<td>Meeting Days:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>08:00</td>
<td>Begin with a T or R</td>
<td>Tue, May 6</td>
<td>7:50-9:50a.m.</td>
</tr>
<tr>
<td>08:00</td>
<td>Begin with a M or W or F</td>
<td>Mon, May 5</td>
<td>7:50-9:50a.m.</td>
</tr>
<tr>
<td>09:00</td>
<td>Begin with a T or R</td>
<td>Thu, May 8</td>
<td>7:50-9:50a.m.</td>
</tr>
<tr>
<td>09:35</td>
<td>Begin with a T or R</td>
<td>Thu, May 8</td>
<td>10:10a.m.-12:10p.m.</td>
</tr>
<tr>
<td>09:00</td>
<td>Begin with a M or W or F</td>
<td>Wed, May 7</td>
<td>7:50-9:50a.m.</td>
</tr>
<tr>
<td>10:00</td>
<td>Begin with a T or R</td>
<td>Fri, May 8</td>
<td>10:10a.m.-12:10p.m.</td>
</tr>
<tr>
<td>10:00</td>
<td>Begin with a M or W or F</td>
<td>Fri, May 9</td>
<td>7:50-9:50a.m.</td>
</tr>
<tr>
<td>11:00</td>
<td>Begin with a T or R</td>
<td>Mon, May 5</td>
<td>12:50-2:50p.m.</td>
</tr>
<tr>
<td>11:00</td>
<td>Begin with a M or W or F</td>
<td>Tue, May 6</td>
<td>12:50-2:50p.m.</td>
</tr>
<tr>
<td>12:00</td>
<td>Begin with a T or R</td>
<td>Fri, May 9</td>
<td>10:10a.m.-12:10p.m.</td>
</tr>
<tr>
<td>12:35</td>
<td>Begin with a T or R</td>
<td>Fri, May 9</td>
<td>10:10a.m.-12:10p.m.</td>
</tr>
<tr>
<td>12:00</td>
<td>Begin with a M or W or F</td>
<td>Wed, May 7</td>
<td>12:50-2:50p.m.</td>
</tr>
<tr>
<td>01:00</td>
<td>Begin with a T or R</td>
<td>Fri, May 9</td>
<td>12:50-2:50p.m.</td>
</tr>
<tr>
<td>01:00</td>
<td>Begin with a M or W or F</td>
<td>Thu, May 8</td>
<td>12:50-2:50p.m.</td>
</tr>
<tr>
<td>02:00</td>
<td>Begin with a T or R</td>
<td>Wed, May 7</td>
<td>3:10-5:10p.m.</td>
</tr>
<tr>
<td>02:00</td>
<td>Begin with a M or W or F</td>
<td>Tue, May 6</td>
<td>5:50-7:50p.m.</td>
</tr>
<tr>
<td>03:00</td>
<td>Begin with a T or R</td>
<td>Thu, May 8</td>
<td>3:10-5:10p.m.</td>
</tr>
<tr>
<td>03:35</td>
<td>Begin with a T or R</td>
<td>Thu, May 8</td>
<td>3:10-5:10p.m.</td>
</tr>
<tr>
<td>03:00</td>
<td>Begin with a M or W or F</td>
<td>Mon, May 5</td>
<td>8:00-10:00P.M.</td>
</tr>
<tr>
<td>04:00</td>
<td>Begin with a T or R</td>
<td>Thu, May 8</td>
<td>3:10-5:10p.m.</td>
</tr>
<tr>
<td>04:00</td>
<td>Begin with a M or W or F</td>
<td>Thu, May 8</td>
<td>8:00-10:00P.M.</td>
</tr>
</tbody>
</table>

**Night classes which meet only on Monday**                      | Mon, May 5 | 5:50-7:50p.m.|
**Night classes which meet only on Tuesday**                    | Tue, May 6 | 8:00-10:00P.M.|
**Night classes which meet only on Wednesday**                  | Wed, May 7 | 8:00-10:00P.M.|
**Night classes which meet only on Thursday**                   | Thu, May 8 | 5:50-7:50p.m.|
**Night classes starting before 7:00p.m. and first meeting day is a Monday or Wednesday** | Mon, May 5 | 5:50-7:50p.m.|
**Night classes starting before 7:00p.m. and first meeting day is a Tuesday or Thursday** | Thu, May 8 | 5:50-7:50p.m.|
**Night classes starting 7:00p.m. or later and first meeting day is a Monday or Wednesday** | Wed, May 7 | 8:00-10:00P.M.|
**Night classes starting 7:00p.m. or later and first meeting day is a Tuesday or Thursday** | Fri, May 9 | 8:00-10:00P.M.|
**Saturday and Sunday**                                          | Fri, May 9 | 12:50-2:50p.m.|
**Make-up examinations for students whose petitions have been approved by their Dean** | Fri, May 9 | 3:10-5:10p.m.|
