Southern Illinois University Carbondale

# ECE 468 Digital Signal Processing Syllabus[1]
# Spring 2014

**Instructor:** Dr. Y. Chen          **Office:** ENGR E-208
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**Office Hours:** Tuesday and Thursday – 1:00 to 4:00 pm or by appointment
**Lecture:** MWF, 10:00 – 10:50 a.m., ENGR A-219
**Lab:**   T. , 9:00-10:50 am, ENGR E-136

**Grading/Evaluation:**

| | |
|---|---|
| Homework | 10% |
| Labs | 20% |
| Exam 1 | 20% |
| Exam 2 | 25% |
| Final Exam (Friday May 9) | 25% |

A: 85-100; B: 75-84; C: 65-74; D: <65

**Classroom Policies:**

A. **Attendance Policy:** Attendance will be taken at random throughout the semester, and it will be counted as bonus points toward the final grade. Students are responsible for all announcements made in class and/or posted to D2L.

B. **Late Homework/Missed Exams:** All assignments should be turned in promptly. Late homework/report will be penalized 10% per day.  If an exam is missed for a legitimate reason, a grade will be assigned based on the remaining homework/exams.

C. **Mobile Technology Policy:**  N/A.

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[1] Pages 2 and 3 are for ABET

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1. **Course number and name**: ECE 468 Digital Signal Processing
2. **Credits and contact hours**: 4 credits, Three 50-minute sessions per week, Fourteen 2-hour sessions in the PC lab.
3. **Course Committee**: L. Gupta, Y. Chen, M. Sayeh
4. **Text book(s), title, author, and year**:
   [1] Digital Signal Processing, A.V. Oppenheim & R.W. Schafer, Prentice Hall Publishers, 1975.
   **References or other supplemental materials:**
   [1] Lecture slides available on D2L
   [2] Digital Signal Processing: Principles, Algorithms, and Applications, J. G. Proakis, O. G. Manolakis, Prentice-Hall, 4th Edition, 2007.
   [3] Digital Signal Processing, S.K. Mitra, McGraw Hill, 3rd Edition, 2006.

5. **Specific course information**
   a. (catalog description): Discrete-time signals and systems: z--transform; discrete Fourier tans-form, fast Fourier transformation algorithms; digital filter design; digital filter realizations.
   b. prerequisites or co-requisites: ECE 355 or equivalent
   c. indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program: Elective for EE and CpE majors
   d. Professional Component {Credit Hours}
      Mathematics  0        Sciences        0        General Ed.   0
      Eng. Science  4        Eng. Design    0

6. **Instructional Objectives (with SO's), ex. The student will be able to explain the significance of current research about a particular topic. (a, b, e, k)**
   The student is expected to have a clear understanding of:
   **1.** The concept of discrete systems and sampling.
   **2.** The concept of z-transform and system function.
   **3.** The concept of discrete Fourier transform.
   **4.** The signal flow graphs.
   **5.** The concept of fast Fourier transform algorithms.
   **6.** Techniques to generate sequence and noise. (a)
   **7.** Computation of discrete convolution, z-Transform, discrete Fourier transform (b)
   **8.** Techniques to design digital filters. (e, k)

7. **Brief list of topics (class, lab and project) to be covered (with hours)[2]**

   a. Classroom Topic (Hours)
   • Discrete time signals and systems {11}
   • The z-transform {6}
   • The discrete Fourier transform {11}
   • Flow graph and matrix representation of digital filters {4}
   • Digital filter design {10}

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[2] subject to change at the instructor's discretion. Students are responsible for announcements made in class and on D2L.

• Fast Fourier transform{5}
b. Laboratory Topics  (Hours)

| | | |
|---|---|---|
| 1. | Sequence generation | 2 |
| 2. | Discrete Convolution | 2 |
| 3. | Impulse response computation | 2 |
| 4. | Discrete time Fourier transform (DTFT) – frequency response | 2 |
| 5. | Sampling | 2 |
| 6. | z-transform | 2 |
| 7. | z-transform | 2 |
| 8. | Discrete Fourier transform (DFT) and Inverse Discrete Fourier Transform | 2 |
| 9. | DFT properties | 2 |
| 10. | Circular Convolution | 2 |
| 11. | Block Filtering | 2 |
| 12. | Analog filter design | 2 |
| 13. | Digital IIR filter design | 2 |
| 14. | Digital FIR filter design | 2 |

8.  **CAD and Computer Tools Used:** Matlab

9.  **Assessment of the Contribution to Student Outcomes**

| Outcome ➜ | a | b | c | d | e | f | g | h | i | j | k |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Assessed ➜ | x | x | | | x | | | | | | x |

Student Outcomes (ABET criteria a-k) are quoted here:

(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
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

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**University Policies**

A. **Incomplete Grades:** 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 a time period designated by the instructor but not to exceed one year from the close of 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, not to exceed one year, or graduation, whichever comes first, the incomplete will be converted to a grade of *F* and the grade will be computed in the student's grade point average. Students should not reregister for courses in which an *INC* has been assigned with the intent of changing the *INC* grade. Re-registration will not prevent the *INC* from being changed to an *F*.

B. **Academic Integrity:** You are expected to submit your original work and adhere to the academic policies as stated in the SIU Student Conduct Code: http://srr.siu.edu (listed under Additional Links). Any act of academic dishonesty, cheating, or plagiarism in any form, including anonymous internet sources used in student papers, will be reported. These acts are taken seriously and the consequences may range from failing as assignment to expulsion from the university.

C. **SIU Email:** Your SIU email account is an official form of University communication. Your instructor will use SIU email as a primary means of electronic communication with students. Please make sure that you maintain a valid password and acquire the habit of regularly checking your SIU email account for important instructor and University announcements. You may view the official SIU Student Email Policy at: http://policies.siu.edu/policies/email.html.

D. **Emergency Procedures:** SIU is committed to providing a safe and healthy environment for study and work. Because some health and safety circumstances are beyond our control, we ask that you become familiar with SIU Emergency response Plan and building Emergency Response Team (BERT) program. Emergency response information is available on posters in buildings on campus, available on BERT's website at http://www.bert.siu.edu/, the SIU Department of Public Safety's website www.dps.siu.edu (disaster dropdown and video, "Shots Fired"), and in the Emergency Response Guideline pamphlet. Know how to respond to each type of emergency. 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.** The Building Emergency Response Team will provide assistance to your

instructor in evacuating the building or sheltering within the facility.

E.  **Supplementary Assistance**:  SIU is committed to assisting students with disabilities.  With the cooperation of SIU's Disability Support Services (DSS), each student who qualifies for reasonable supplementary assistance has the right to receive it.  Students requesting supplementary assistance must first register with DSS in Woody Hall, B-150, 618-453-5738 or 618-453-2293 (TTY), by email DSS@siu.edu, or http://disabilityservices.siu.edu/.  Notice:  If you have any type of special need(s) or disability for which you require accommodations to promote your learning in class, please contact me as soon as possible.  The Office of Disability Support Services (DSS) offers various support services and can help you with special accommodations.  You may wish to contact DSS to verify your eligibility and options for accommodations related to your special need(s) or disability.

**Student Services**

A.  **Learning Support Services:**  The Center for Learning Support Services (CLSS) assists students of all cultures, abilities, backgrounds and identities with enhancing their self-management and interdependent learning skills.  Programs offered by CLSS include: group study sessions; math tutoring; academic coaching; early intervention program; and study skills seminars.  For additional information please contact CLSS in Woody Hall, Room A-313, 618-453-2925, or www.tutoring.siu.edu.

B.  **Writing Center:**  The Writing Center offers free tutoring services and assistance with improving writing skills to all SIU undergraduate students and faculty.  For center locations and hours, to schedule an appointment online, and to view information regarding the Online Writing Lab (OWL) contact the Writing Center at 618-453-1231 (Morris Library location); 618-453-2927 (Trueblood location), or www.write.siu.edu.

C.  **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.  To make a referral to Saluki Cares click, call or send: http://salukicares.siu.edu/index.html; 618-453-5714, or siucares@siu.edu.