EE395 Introduction to Digital Signal Processing (3 credits)
Fall 2012
Klipsch School of Electrical and Computer Engineering
College of Engineering
New Mexico State University

Instructor and Class Information
Instructor: Prof. Phillip De Leon, Goddard Annex 160G; (575) 646-DSP1 (3771); pdeleon @ nmsu . edu
Date and Time: M, W, F 10:30 – 11:20am, T&B 307
Office Hours: W 2:00 – 3:00pm, Th 2:00 – 3:00pm, and by *prior* appointment

Course Description from the Undergraduate Course Catalog
Undergraduate treatment of sampling/reconstruction, quantization, discrete-time systems, digital filtering, z-transforms, transfer functions, digital filter realizations, discrete Fourier transform (DFT) and fast Fourier transform (FFT), finite impulse response (FIR) and infinite impulse response (IIR) filter design, and digital signal processing (DSP) applications.

Prerequisite
A grade of C or better in EE314 Signals and Systems II. Students will be automatically dropped without these prerequisites and corequisite. Note: Students under older catalogs with a C or better in EE311 or EE312 may register to take this course.

Textbook and Other Required Materials
Introduction to Signal Processing, by Sophocles Orfanidis (available at Kinko's on University Ave. for $54*)
http://www.ece.rutgers.edu/~orfanidi/intro2sp/

DSP Software Toolkit by Phillip L. De Leon (available at Kinko's on University Ave. for $20*)
http://www.ece.nmsu.edu/~pdeleon/Teaching/EE395/DSP_Toolkit.pdf

* with student discount

Only the following Klipsch School-approved calculators will be allowed during exams: Casio fx-115 models (calculator must contain fx-115 in its model name), HP 33s and HP 35s, and TI-30X and TI-36X models (calculator must contain TI-30X or TI-36X in its model name).

Laboratory Resources
The DSP teaching laboratory is located in T&B 206 and equipped with PCs and MATLAB.

Online Resources
EE395 Web Page
http://www.ece.nmsu.edu/~pdeleon/EE395

Course announcements will be emailed via Canvas. Student grades will be posted on Canvas. For more information see
http://learn.nmsu.edu

Note: Please do not email Prof. De Leon through Canvas--use the email address listed above.

Course Objectives
The objective of this course is to gain an understanding of DSP through analysis and application of the following:
1. sampling and reconstruction and quantization effects
2. discrete-time systems, digital filtering, and digital filter realizations
3. z-transform analysis
4. discrete Fourier transform (DFT) and fast Fourier transform (FFT)
5. finite impulse response (FIR) and infinite impulse response (IIR) filter design

Contribution of EE395 to Meeting the Professional Component
Introduction to DSP is the undergraduate foundation course in DSP within the Electrical Engineering curriculum and is considered an engineering topics course in the Professional Component. Students in EE395 will apply techniques learned in class through assigned homework, software development, and in-class discussions. Techniques learned in this class will provide students with a broadening of their knowledge base to see applications of basic mathematics and engineering science techniques to the processing and analyzing of signals in the digital domain, provide preparation for capstone design project, and provide a basis for career employment or graduate school. Discussion of design issues relate the class theory to practical societal issues. Class provides 3 credits of engineering science credit.

Relationship of the Course to Program Objectives
Introduction to DSP builds upon mathematics and engineering techniques learned in previous courses to provide an electrical engineering breadth elective to give students

- an understanding of actual products (DSP-based electronics)
- a basis for capstone design classes
- a preparation for career employment or graduate school
- an opportunity to use computers in engineering problem solving

This will allow students to further explore their major specialty as well as seeing applications of basic techniques learned from calculus, linear algebra, linear systems theory, and other engineering classes.

Americans with Disabilities Act/Office of Institutional Equity (ADA/OIE)
Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act (ADA) covers issues relating to disability and accommodations. If a student has questions or needs an accommodation in the classroom (all medical information is treated confidentially), contact:

Trudy Luken
Student Accessibility Services (SAS) - Corbett Center, Rm. 244
Phone: (575) 646-6840 E-mail: sas@nmsu.edu
Website: `http://www.nmsu.edu/~ssd/`

NMSU policy prohibits discrimination on the basis of age, ancestry, color, disability, gender identity, genetic information, national origin, race, religion, retaliation, serious medical condition, sex, sexual orientation, spousal affiliation and protected veterans status. Furthermore, Title IX prohibits sex discrimination to include sexual misconduct, sexual violence, sexual harassment and retaliation. For more information on discrimination issues, Title IX or NMSU's complaint process contact:

Gerard Nevarez or Agustin Diaz
Office of Institutional Equity (OIE) - O'Loughlin House
Phone: (575) 646-3635 E-mail: equity@nmsu.edu
Website: `http://www.nmsu.edu/~eeo/`

Prepared
Phillip De Leon, 23 August 2012.

Grading
Homework (25%) - Homework assignments will be posted online and announced in class and will consist of textbook problems and miscellaneous software projects. Late homework is not accepted except in the case of an absence due to a medical or other very serious reason. Homework grade is worth 25% of the final grade.

Exams (25% each) - There will be two exams each worth 25% of the final grade
- Exam #1 is scheduled for Sep. 26.
- Exam #2 is scheduled for Oct. 31.

Final Exam (25%) – The final examination is scheduled for Monday, Dec. 10 from 10:30am – 12:30pm and is worth 25% of the final grade.

Note: No early exams will be given. No makeup exams will be given unless a very serious situation arose which prevented taking the exam as scheduled.

Final Grades - Final grades will be assigned as follows (we reserve the right to lower the grade ranges for particular letter grades but will never raise the grade ranges)

A+	>100%	C+	79 – 76%
A	100 – 95%	C	75 – 73%
A–	94 – 90%	C–	72 – 70%
B+	89 – 86%	D+	69 – 66%
B	85 – 83%	D	65 – 63%
B–	82 – 80%	D–	62 – 60%

The NMSU Student Code of Conduct can be found at http://www.nmsu.edu/~vpsa/SCOC/scoc.pdf

Plagiarism is using another person's work without acknowledgment, making it appear to be one's own. Intentional and unintentional instances of plagiarism are considered instances of academic misconduct and are subject to disciplinary action such as failure on the assignment, failure of the course or dismissal from the university. The NMSU Library has more information and help on how to avoid plagiarism at
`http://lib.nmsu.edu/plagiarism/`

Policies
Disputes regarding project grades must be submitted in writing to Prof. De Leon for review within 7 days after graded work has been returned or posted.

As a courtesy to the instructor and fellow students, please TURN OFF your cell phones and other electronic devices. Any student who disrupts class due to the use of an unwelcomed electronic device will be asked to leave.

Topics Covered / Course Schedule
The topics covered and course schedule are described in the Course Schedule section of this syllabus.

EE395 Fall 2012 Course Schedule

Week 1 August 19, 2012

Chapter 1: Sampling and Reconstruction

Week 2 August 26, 2012

Chapter 1: Sampling and Reconstruction

Week 3 September 2, 2012

Chapter 2: Quantization
Labor Day (no classes)

Week 4 September 9, 2012

Chapter 3: Discrete-Time Systems (review)

Week 5 September 16, 2012

Chapter 4: FIR Filtering and Convolution

Week 6 September 23, 2012

Sep. 26, Exam #1 (Chapters 1, 2, 3, 4)
Chapter 5: *z*-Transforms

Week 7 September 30, 2012

Chapter 6: Transfer Functions

Week 8 October 7, 2012

Chapter 6: Transfer Functions

Week 9 October 14, 2012

Chapter 7: Digital Filter Realizations

Week 10 October 21, 2012

Chapter 8: Signal Processing Applications

Week 11 October 28, 2012

Oct. 31, Exam #2 (Chapters 5, 6, 7)
Real-Time DSP Implementations in C

Week 12 November 4, 2012

Chapter 9: DFT/FFT Algorithms

Week 13 November 11, 2012

Chapter 10: FIR Filter Design

Week 14 November 18, 2012

Thanksgiving (no classes)

Week 15 November 25, 2012

Chapter 11: IIR Filter Design

Week 16 December 2, 2012

Chapter 12: Interpolation, Decimation, and Oversampling

Week 17 December 9, 2012

Dec. 10, 10:30am – 12:30pm Final Exam (Comprehensive)