

EEL 4511: REAL-TIME DSP APPLICATIONS

INSTRUCTOR

Dr. Karl Gugel gugel@ufl.edu Office Hours: MWF 9:00 - 9:30, 10:30 - 11:30 am, 265 NEB

LECTURES

EEL4924	MWF 3 rd period (9:35 - 10:25 am)	LAR 330	Senior Design
EEL4924	MWF 7 th period (1:55 - 2:45 pm)	LAR 239	Senior Design
EEL4511	MWF 8 th period (3:00 - 3:50 pm)	LAR 330	RT DSP App.

LAB SECTIONS (NEB 281)

Mon 12279 6:15 – 8:10 pm	Tue 12281 8:20 - 10:10 pm	Wed 12251 4:05 PM - 6:00 PM
Thur 12282 8:30 AM - 10:25 AM	Thur 12283 4:05 PM - 6:00 PM	Fri 12280 8:30 AM - 10:25 AM

CATALOG DESCRIPTION

Real world digital signal processing (DSP) tasks are presented and solved in a lab environment that utilizes a 150 MHz Floating Point DSP & a sophisticated code development tools/hardware emulation.

COURSE OBJECTIVES (ABET Design Content 50%)

To understand the differences between floating point and fixed point DSP implementations. To be able to design and implement low, high and band pass filters in the digital domain. To study and accurately employ appropriate digital sampling and windowing of data techniques. To understand and use the Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT) algorithms in Spectrum analysis related problems.

TEXTBOOK

Not required, instead we will rely on various Texas Instruments data pages (technical documents) identified in the lab link on the below website:

OFFICE HOURS & HOMEPAGE

My office hours are not flexible. If you can't attend them, see me between classes or visit a TA during their office hours. <http://www.add.ece.ufl.edu/4511>

HARDWARE PURCHASES

- TI TMS32028379 Development board & lab parts kit will be handed out later in lab.
- Optional Wire-wrap tool and Soldering Iron, highly recommended for work at home.

REQUIRED SOFTWARE

We will download TI's free software development tool, Code Composer Studio. Near the end of the class you will need PC access to use Matlab for filter design and FFT experimentation.

REFERENCE MATERIALS (Optional)

- Numerical Recipes in C by Press, Teukolsky, Vetterling and Flannery, 2nd Ed. (ISBN#: 0521431085)
- Discrete-Time Signal Processing by Oppenheim and Schaffer, 1st Ed. (ISBN#: 013216292X)

COURSE GRADE DETERMINATION

Exam #1*	10%	
Exam #2*	10%	
Homework	5%	
Laboratory	75%	;Lab weighting: Lab1 0%, Lab2 5%, Labs 3 – 9 10% each

* When exams are handed back for review in class, **all re-grades are due the same day.**

WORKING TOGETHER

You are encouraged to work together on homework assignments and share ideas on lab assignments. However, you are not allowed to copy or duplicate any lab material (code, drawings, etc.) from another student. This work will be considered cheating and will be dealt with in a severe manner.

LABORATORY RULES

1. No food, drinks, dancing or smoking in the Lab!
2. Students work ***individually*** on each Lab project.
3. It is the student's responsibility to return all equipment and clean her/his work area before leaving the Lab.
4. Students must attend labs during their assigned time.
5. Students must come prepared to the Lab. ***No student will be admitted to the Lab without the pre-lab work in hand***, i.e., printout(s) and a memory stick with hardware and software designs.
6. Labs are 2 hours long.
7. You must show up at the standard lab starting time for check-in. If you are late, you may miss a lab quiz and thus get a zero for the quiz.

EEL 4511 Real-Time DSP Applications Subjects

Class Schedule (Part 1 of 2)

WEEK/DAY	DATE	HW	LAB #	Status	Comments
1	M	1/7		None	Basic Computer Architectures
1	T	8		None	
1	W	9		None	Basic Computer Architectures
1	Th	10		None	
1	F	11			Computer Architectures & Memory Interfacing
2	M	14		1	Introduction to Code Composer & DSP Programming Model
2	Tu	15		1	
2	W	16		1	Code Composer Debugger & DSP Programming Model
2	Th	17		1	
2	F	18	1	1	DSP Instruction Set
3	M	21		No Class	Holiday
3	Tu	22		Workshop	
3	W	23		Workshop	DSP Assembly Language Programming, GPIO
3	Th	24		Workshop	
3	F	25		Workshop	DSP Assembly Language Programming, GPIO
4	M	28		Workshop	Stack & Software Design Concepts (Flow Charts)
4	Tu	29		Workshop	
4	W	30		Workshop	LCDs, Keypads, Raster Scan
4	Th	31		Workshop	
4	F	2/1	2	Workshop	LCDs, Keypads, Raster Scan
5	M	4		2	Computer Buses and Parallel I/O
5	Tu	5		2	
5	W	6		2	Computer Buses and Parallel I/O
5	Th	7		2	
5	F	8	3	2	Memory Timing Diagrams
6	M	11		3	Interfacing SRAM
6	Tu	12		3	
6	W	13		3	Interfacing SRAM
6	Th	14		3	
6	F	15	4	3	Interrupts, Interrupt Handlers, Timer Interrupt
7	M	18		Workshop	<i>Review</i>
7	Tu	19		Workshop	
7	W	20		No Lab	Exam I in class
7	Th	21		No Lab	
7	F	22		No Lab	Analog I/O & Noise & Dynamic Range
8	M	25		4	Exam I handed back, Analog I/O
8	Tu	26		4	
8	W	27		4	Bit Banging, Serial A/Ds
8	Th	28		4	
8	F	3/1	5	4	More Timing Diagrams, Serial D/As
9	M	4		No Lab	No Class
9	Tu	5		No Lab	
9	W	6		No Lab	No Class
9	Th	7		No Lab	
9	F	8		No Lab	No Class

EEL 4511 Real-time DSP Applications Subjects

Class Schedule (Part 2 of 2)

WEEK/DAY	DATE	HW	LAB #	Status	Comments
10	M	11		Workshop	SPI & Sampling Theory
10	Tu	12		5	
10	W	13		5	SPI & Sampling Theory
10	Th	14		5	
10	F	15	6	5	Sound Manipulation
11	M	18		5	C Programming Examples
11	Tu	19		Workshop	
11	W	20		6	Digital Filtering (FIR)
11	Th	21		6	
11	F	22	7	6	Digital Filtering (FIR)
12	M	25		6	In class experimentation with filters via Matlab
12	Tu	26		6	
12	W	27		Workshop	Digital Filtering (IIR)
12	Th	28		7	
12	F	29	8	7	Digital Filtering (IIR)
13	M	4/1		7	Discrete Fourier Transform (DFT) &
13	Tu	2		7	
13	W	3		7	Exam II Review
13	Th	4		Workshop	
13	F	5		No Lab	Exam II in class
14	M	8		8	Guest lecture
14	Tu	9		8	
14	W	10		8	Fast Fourier Transform vs. DFT
14	Th	11		8	
14	F	12	9	8	Exam II handed back.
15	M	15		Workshop	No Class
15	Tu	16		Workshop	
15	W	17		Workshop	Special Topics
15	Th	18		Workshop	
15	F	19	10	Workshop	Lab 9 - Special Effect Demos (Thur/Fri Students)
16	M	22		No Lab	Lab 9 - Special Effect Demos (Mon/Tue/Wed Students)
16	Tu	23		No Lab	
16	W	24		No Lab	Lab 9 - Special Effect Demos (Overflow Buffer)
16	Th	25		No Lab	Reading Day
16	F	26		No Lab	No Class Reading Day/End of Semester!

NOTE:

“Workshop” refers to an open lab intended to help students: (1) correct deficiencies from previous laboratory assignments; and/or (2) get an early start on the next laboratory assignment. Students should go to their designated registered lab/workshop section unless given prior approval by Dr. Gugel or our lab Teaching Assistant(s).