

# ECE-723 Advanced electronics: Syllabus

Spring 2011

<http://venus.ece.ndsu.nodak.edu/~cris/ece723/index.html>

## Course info

ECE-723, Advanced Electronics, 3 credits.

Prereq: ECE-421/621 Communication Circuits.

Lecture: MW 4:00-5:30pm in ECE-125.

## Instructor

Cristinel Ababei, [cristinel.ababei@ndsu.edu](mailto:cristinel.ababei@ndsu.edu)

Phone: 701-231-7617

Office: ECE-101F

Office hours: MW 3:00-4:00pm or open-door office policy.

## Bulletin description

Characteristics and detailed modeling of operational amplifiers. Applications to waveform generation, analog multiplication, modulation, and data conversion. IC and special amplifiers.

## Textbook

[F03] Sergio Franco, *Design with Operational Amplifiers and Analog Integrated Circuits*, McGraw Hill, 3rd edition, 2003. **Required.**

Recommended:

[G03] Paul R. Gray, Paul J. Hurst, Stephen H. Lewis, Robert G. Meyer, *Analysis and Design of Analog Integrated Circuits*, John Wiley & Sons, 2003.

[J97] Ken Martin, *Analog Integrated Circuit Design*, David Johns, John Wiley & Sons, 1997.

[R03] Behzad Razavi, *Design of Analog CMOS Integrated Circuits*, McGraw Hill, 2003.

[FB01] Thomas L. Floyd, David M. Buchla, *Fundamentals of Analog Circuits*, Prentice Hall, 2001.

[S92] Adel S. Sedra, K. C. Smith, *Microelectronic Circuits*, Oxford University Press, 1992.

## Course objectives

Illustration of general analog principles and design methodologies, with focus on: Operational Amplifiers (OpAmps) and applications, Current feedback amplifiers, Active filters, and D-A, A-D converters.

## Grading

-- Grade breakdown: A = [90-100], B = [80-90), C = [70-80), D = [60-70).

-- Final grade components:

- Pretest: 5%

- Midterm exam: 25%

- Final exam: 25%

- Project and milestone reports: 30%

- Homework: 15%

-- Makeup exams will only be allowed in special situations. The extraordinary circumstances requiring a makeup exam must be verifiable.

## Homework

-- Homework submissions are due before class starts. No late submissions are accepted.

-- If you are absent from class or you know that you will be absent from class, you should as soon as possible arrange with the instructor for any missed work. It is the student's responsibility to contact the instructor in such a case. Arrangements made in advance of an absence (if approved -- depends on the reason of absence) may allow full credit to be given for late work.

-- Collaboration on homework is ok, copying is not ok; a separate solution is required for each student.

-- Include your name on all homework assignments, reports, and exams.

### Project and conference-paper format milestone reports

Each student will work on a semester-long individual project and will have to write three conference-paper format milestones reports. The topic of each project must be relevant to the topics studied in this course; it will be selected in consultation with the instructor.

### Special needs

Any students with disabilities or other special needs, who need special accommodations in this course, are invited to share these concerns or requests with the instructor as soon as possible.

### Academic honesty

All work in this course must be completed in a manner consistent with NDSU University Senate Policy, Section 335: Code of Academic Responsibility and Conduct. Violation of this policy will result in receipt of a failing grade. Please read: <http://www.ndsu.nodak.edu/policy/335.htm>

### Others

-- While university regulations do not require attendance in class, the student should know that there may be material covered in class which is not discussed in the text or which may be discussed in a different manner than presented in the text. The student is responsible for all the material discussed in class whether or not the student was in class. If the student misses a class period, it is the student's responsibility to obtain the notes from a classmate.

-- If the student has questions about the way a particular homework or exam problem was graded, s/he should discuss this with the instructor during office hours. However, this must be done within one week the exam or homework was returned to the class. This does not apply to the final exam.

-- Questions during class are highly encouraged.

-- Do not pack your stuff and get ready to leave with minutes before the lecture is over -- this annoys your colleagues.

-- Usage of cell phones, laptops, newspapers, magazines, etc. is not allowed during lectures.

### Course outline and schedule (NOTE: This is subject to change during the term.)

Week	Day and date	Ch.	Pages	Topics
1	M Jan 10 <b>W Jan 12</b>			Introduction <b>Pretest</b>
2	<b>M Jan 17</b> W Jan 19	1	1-15	<i>HOLIDAY - Martin Luther King, Jr. Day (no classes)</i> OpAmp fundamentals and configurations
3	M Jan 24 W Jan 26	1	15-29	Ideal OpAmp with feedback – analysis
4	M Jan 31 W Feb 2	1	29-47	Non-ideal OpAmp – feedback, powering
5	M Feb 7 W Feb 9	2	60-97	Linear applications of OpAmps
6	M Feb 14 W Feb 16	5	211-244	Static limitations of OpAmps
7	<b>M Feb 21</b> W Feb 23	5	211-244	<i>HOLIDAY - Presidents' Day (no classes)</i> Static limitations of OpAmps
8	M Feb 28 W Mar 1	6	258-303	Dynamic limitations, current feedback amplifiers
9	M Mar 7 <b>W Mar 9</b>	8	347-390	Stability and compensation of OpAmps <b>Midterm Exam</b>
10	<b>Mar 14-18</b>			Spring Break Week (no classes)
11	M Mar 21 W Mar 23	9	398-443	Nonlinear OpAmp circuits
12	M Mar 28	10	449-486	Waveform generators

	W Mar 30			
13	M Apr 4 W Apr 6	10	486-492	V-f and f-V converters
14	M Apr 11 W Apr 13	3	106-152	Active filters
15	M Apr 18 W Apr 20	12	559-602	D-A, A-D converters
16	<b>M Apr 25</b> W Apr 27			<i>HOLIDAY/Recess (no classes)</i> Selected topics
17	<b>M May 2</b> W May 4			<i>Student project presentations</i> Selected topics
18	W May 11			<b>Final Exam 1:30am – 12:30pm</b>