

ECE 5/411 CMOS Analog IC Design

Course Introduction

Vishal Saxena
(vishalsaxena@boisestate.edu)

Course Outline

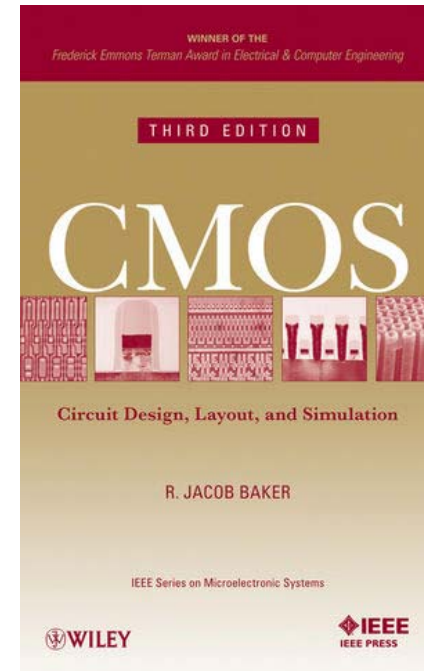
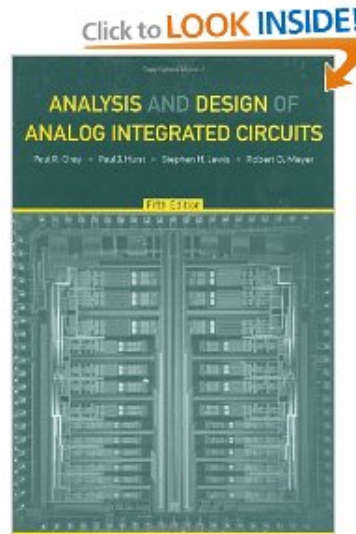
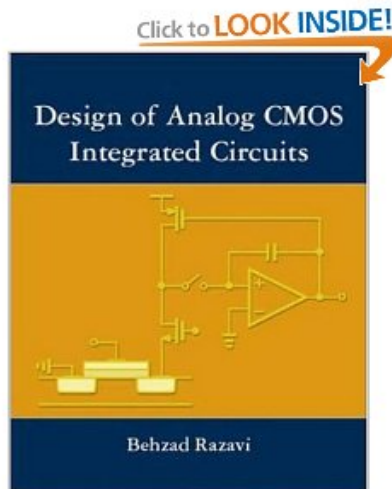
- ❑ **Instructor** : Vishal Saxena
- ❑ **Time** : Tue/Thu 6:00-7:15 PM
- ❑ **Course dates** : Jan 22 – May 10, 2013
- ❑ **Location** : MEC 309
- ❑ **Office Hours** : Tue/Thu 4:30-5:30 p.m.
- ❑ **Holidays** : March 26 & 28.
- ❑ **Final Exam time**: Monday, May 16, 2011, 5:00-7:00 p.m.
- ❑ **Website** : <http://lumerink.com/courses/ece5411/s13/ECE5411.htm>

Course Topics

- ☐ Analog Modeling
- ☐ Current mirrors
- ☐ Voltage references
- ☐ Negative feedback systems and stability
- ☐ Amplifiers, frequency compensation, opamps.
- ☐ PREREQ: ECE 5/410.

Textbook and References

- ❑ CMOS Circuit Design, Layout and Simulation – R. J. Baker, 3rd Edition, Wiley-IEEE, 2010.
- ❑ B. Razavi, “Design of Analog CMOS Integrated Circuits,” McGraw-Hill, 2002.
- ❑ For detailed references and handouts see this [page](#).



Course Pedagogy, Grading and Policies

☐ Combination of lecture notes, slides and simulation

- ✓ Lecture notes will be posted online
- ✓ Additional slides, Matlab code etc will also be posted.

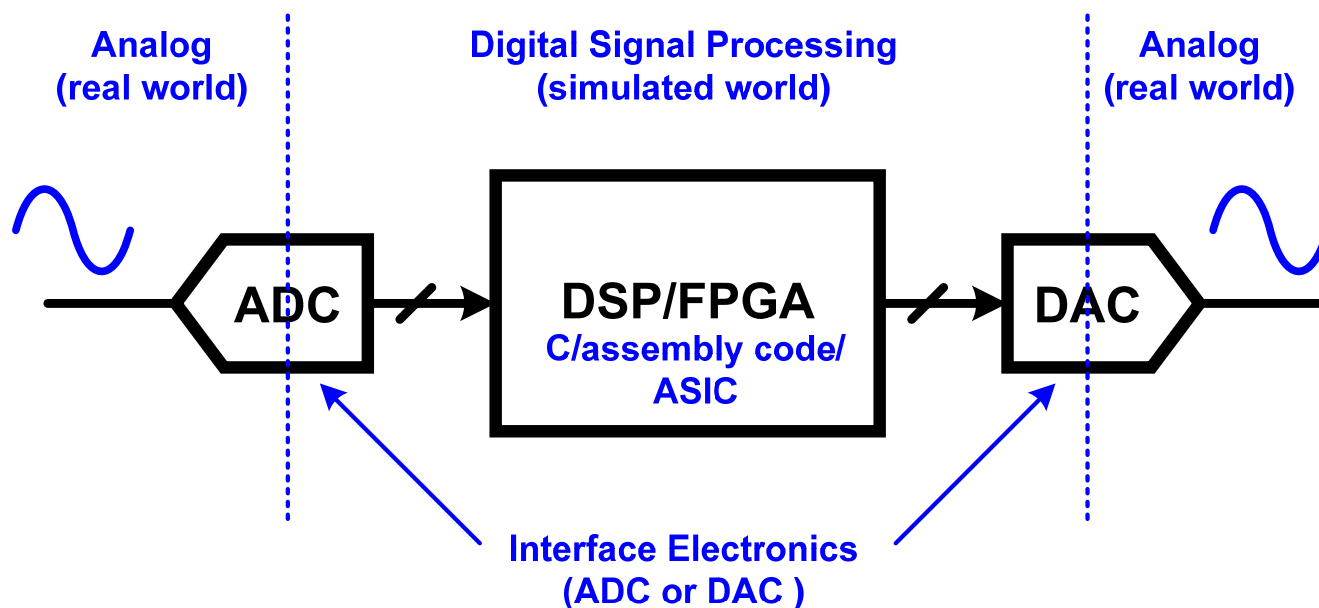
☐ Workload (Grading)

- ✓ Homeworks (20%): Weekly assignments.
- ✓ Midterm Exam1 (20%)
- ✓ Midterm Exam2 (20%)
- ✓ Project 1 (20%): Opamp design and characterization
- ✓ Final (20%)

☐ Policies

- ✓ No late work.
- ✓ Neither the final exam nor final project will be returned at the end of the semester.
- ✓ Plagiarism is not acceptable.

Why Analog ?

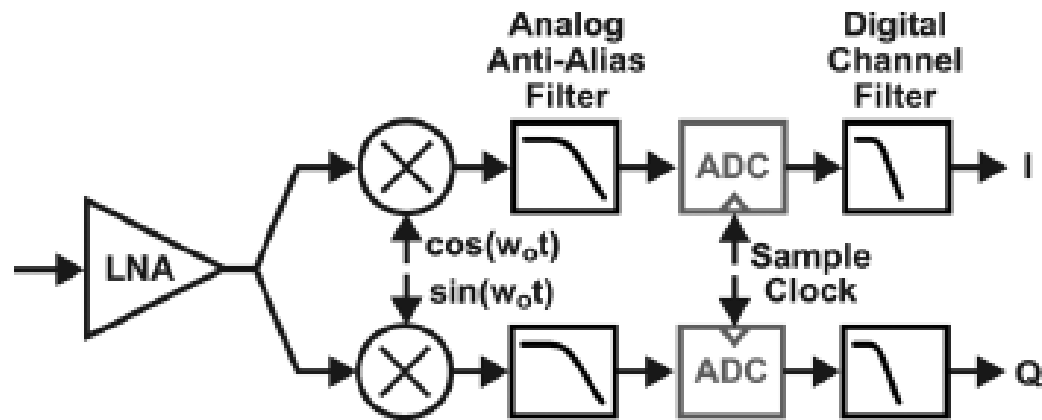


- ☐ Real world is analog.
- ☐ Digital world: Discrete-time, discrete-amplitude signal representation.
 - ✓ Interface circuits: ADC and DACs.
- ☐ High speed circuits are analog (Serial IOs, 60 GHz RF)

Analog Circuits in Modern VLSI Systems

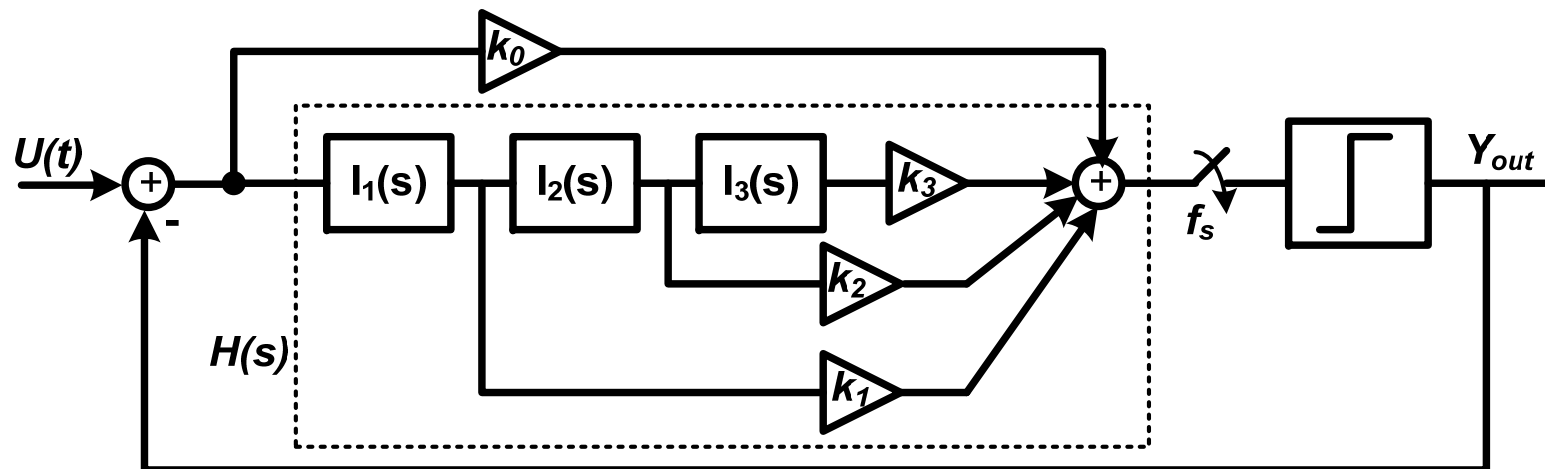
- ☐ Analog to digital conversion
- ☐ Digital to analog conversion
- ☐ Amplification
- ☐ Analog filters
- ☐ Signal processing circuits at high frequencies
 - ✓ RF, Serial IO, etc.
- ☐ **Power management-voltage references, voltage regulators**
- ☐ **Oscillators**
 - ✓ The last two are found even on many “digital” ICs

System Level View

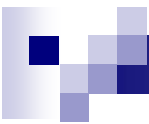


- ❑ Top-down approach is used in system design.
- ❑ Scope: Thesis/dissertation work.

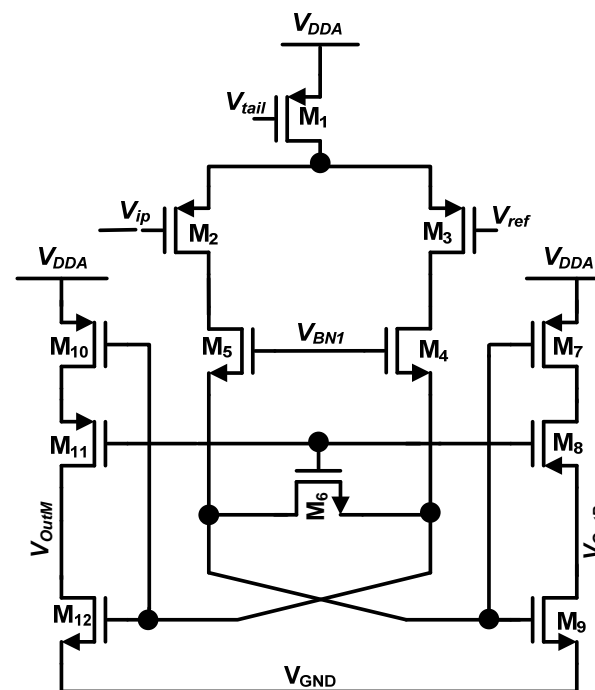
Block Level View



□ Scope: Data converters, Advanced Analog courses.



-



- ❑ In this course, we will deal with basics of transistor-level analog design.

Die and PCB

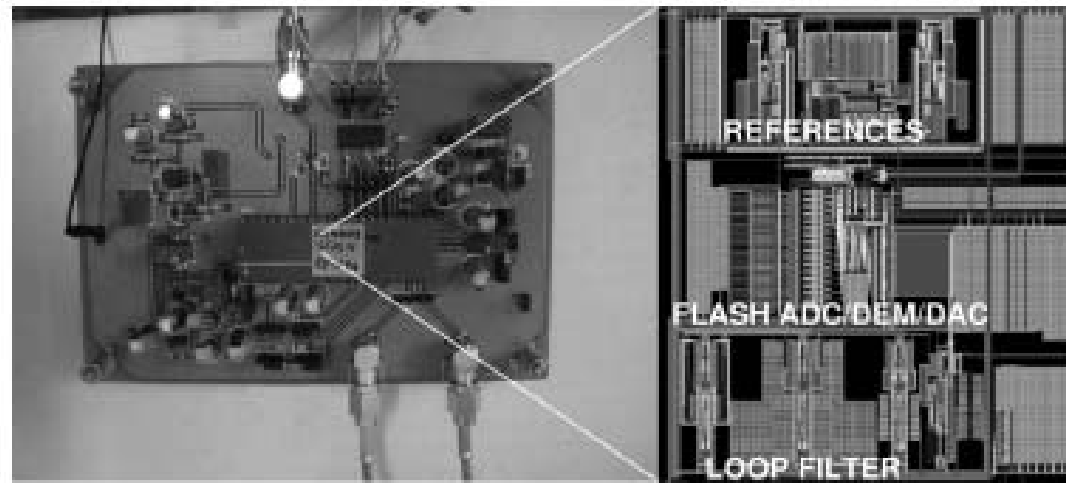


Fig. 16. Test board and chip layout.