

EC1010: Electrical and Magnetic Circuits

Introduction

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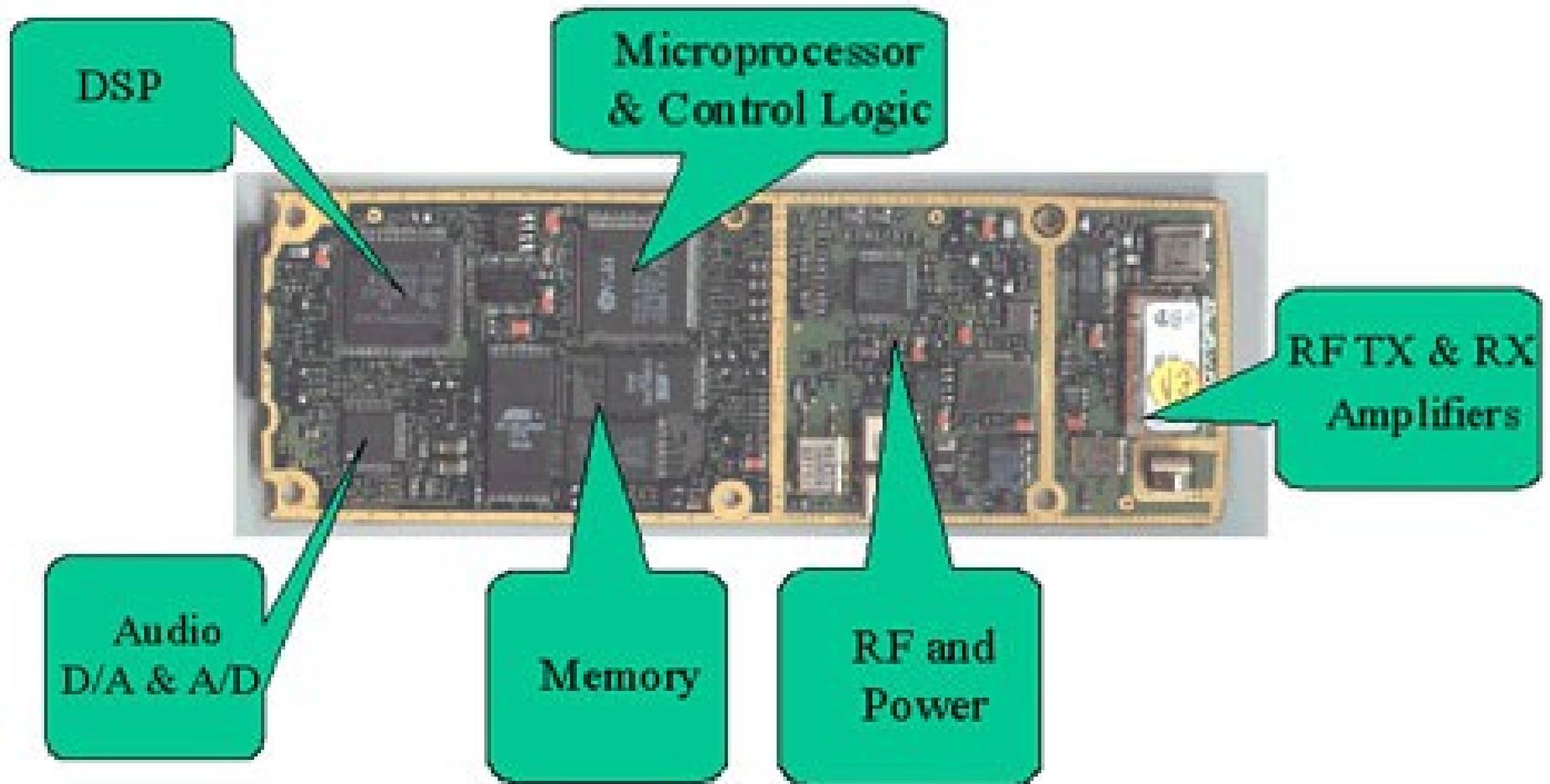
EC1010: Moodle page

www.ee.iitm.ac.in/courses/ec1010_2014/start

What are E & M Circuits?

- Electrical Circuits:
 - Interconnection of Electrical Components
 - All electronic and electrical gadgetry
- Magnetic Circuits:
 - Interconnection of Magnetic Components
 - Generators, Motors, Transformers
- Absolutely everywhere around us!

Mobiles, Laptops, Music players, ...



[<http://static.ddmcdn.com/gif/cell-phone-inside.jpg>]

Mobiles, Laptops, Music players, ...



[<http://smartech.blogetery.com/files/2008/04/asus-eee-pc-900-inside.jpg>]

Transformers, Generators, ...



[http://i01.i.aliimg.com/photo/v0/110482299/Power_Transformer.jpg]

[<http://media.digikey.com/Renders/Johanson%20Tech%20Renders/2.45GHz%20Balun6.jpg>]

What is EC1010 all about?

- Analysis techniques applicable to **all circuits**
- Not about any particular circuit
- One of the two most important EE courses (the other being Networks and Systems)
- Pre-requisite for:
 - Networks and Systems
 - Electrical Machines
 - Analog Circuits
 - Placements in core EE companies!

Course topics

- Electrical quantities and elements
- Electrical circuit analysis; Theorems
- One and two port networks; Transformations
- Negative feedback and ideal opamp
- RL, RC, RLC circuits
 - Solving differential equations
 - Forced and natural response
 - Sinusoidal steady state; Phasors
- Polyphase circuits
- Magnetic circuits

Course goals

- Learn circuit analysis and learn it well!
 - Practice, practice, and practice problem solving
 - Understand every step of problem solving
- Learn about linearity and its implications
- Learn rudiments of nonlinear circuit analysis

Logistics

- Time table:
 - A slot(Mo 8am, Tu 1pm, Th 11am, Fr 8am)
 - Classroom: CRC101
- Evaluation
 - 4 quizzes (total of 50-60%; Feb. 3, Feb. 24, Apr. 7, Apr 25)
 - End sem (40%)
 - Problem sets (up to 10%)

Logistics-those with F slot clash

- Time table:
 - A slot(Mo 8am, Tu 1pm, Th 11am), **F slot(Fr 10am)**
 - Classroom: TBA

Tutorials

- ~ 10 tutorials over the semester
- Problem sets will be posted in advance
- Must solve problems before the tutorial session and bring the solution to class
- Use tutorial sessions for clarifications and understanding difficult concepts

Classroom etiquette and expectations

- Mobile phones off
- 85% attendance
- Don't enter the class if more than 5 minutes late
- TAs take attendance in the first 5 minutes
- Don't sit in the back rows
- **Must solve problems** given in class
 - Bring your pen, notebook, calculator and **use them**
- **Participate** in classroom Q&A

Classroom participation

- Get your doubts cleared
- Improve your understanding
- Develop (technical) communication skills
 - Poor communication skills-a constant complaint from prospective employers

“Learning” or “Knowing” something

- What does it mean?

“Learning” or “Knowing” something

- Make quantitative predictions about similar or slightly different situations
- Practice solving a variety of problems...
- ...while understanding every step
- Will not happen without your active participation both inside and outside the classroom

Some inspiration

- <http://teachingexcellence.mit.edu/inspiring-teachers/amar-bose-6-312-lecture-01-introduction>
- <http://teachingexcellence.mit.edu/inspiring-teachers/amar-bose-6-312-lecture-27-personal-reflections>

Announcement

- No class on Monday, Jan 20th
- Extra (tutorial) class on Saturday, Jan 25th
 - 9-950am
 - Venue: TBA

Resources

- Class homepage
 - EC1010 page on moodle-Use the forum!
 - http://www.ee.iitm.ac.in/vlsi/courses/ec1010_2012/start
- Lectures recorded in the classroom:
 - <http://www.ee.iitm.ac.in/~nagendra/videolectures/>
- Textbook
 - Hayt, Kemmerly, and Durbin, *Engineering Circuit Analysis*, 7th Edition, McGraw Hill 2006.
- Extras: NPTEL(<http://nptel.iitm.ac.in>)
 - SC Dutta Roy, *Circuit Theory*,
<http://nptel.iitm.ac.in/video.php?subjectId=108102042>

Resources: TAs

- Visiting hours: TBA, venue: EE Dept. library
- Use moodle forum to reach the TAs

Videlectures page

start [VLSI group, IIT M: x]

www.ee.iitm.ac.in/~nagendra/videlectures/doku.php

VLSI GROUP, IIT MADRAS-VIDEO LECTURES

Show pagesource Old revisions Recent changes Search

Trace: » start

VLSI group, IIT Madras-Video lectures

Welcome to the video lectures page of the VLSI group of the department of Electrical Engineering at IIT Madras. You can find recorded lectures from our courses at the links below.

NPTEL courses

- Analog IC Design: Nagendra Krishnapura
- VLSI Data Conversion Circuits: Shanthi Pavan

Online course: Jan-May 2013

Basic Electrical Circuits was offered by **Nagendra Krishnapura** as an online course on the internet in the Jan.-May 2013 semester. To view the lectures, visit [this link](#).

Courses

- EC1010: Electrical and Magnetic Circuits
 - Jan.-May 2014: Nagendra Krishnapura
 - Jan.-May 2013: Nagendra Krishnapura
 - Jan.-May 2012:
 - Nagendra Krishnapura
 - Shanthi Pavan
- EC3102: Analog Circuits/EC5135: Analog Electronic Circuits
 - Aug.-Nov. 2012:
 - Aniruddhan S
 - Nagendra Krishnapura
 - Aug.-Nov. 2011: Nagendra Krishnapura

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• NPTEL courses
• Online course: Jan-May 2013
• Courses
• Self study program for analog design
• Prerequisites
• Other presentations
• About these lectures
• Miscellaneous information

- <http://www.ee.iitm.ac.in/~nagendra/videlectures/>
- <http://10.21.2.66/~nagendra/videlectures/>

Course page on VLSI group site

The screenshot shows a web browser window with the URL www.ee.iitm.ac.in/vlsi/courses/ec1010_2014/start. The page header identifies the VLSI group at IIT Madras and includes a navigation menu with links for Home, People, Research, Publications, Teaching, Prospective Students, SMDP, and TI RAships. The main content area is titled "EC1010: Electrical and Magnetic Circuits(Jan.-May 2014)" and features a "Table of Contents" sidebar with links to Instructor, Classrooms, Schedule, Teaching Assistants, Evaluation, Recorded lectures, and Tutorials. The page also includes sections for Instructor (Nagendra Krishnapura), Classrooms (CRC101), Schedule (A slot: Mo 8am, Tu 1pm, Th 11am, F slot: Fr 8am), Teaching Assistants (contact via Moodle page), Evaluation (four quizzes and an end semester exam), Recorded lectures (available here), and Tutorials (problem sets to be posted).

VLSI group, IIT Madras

Home People Research Publications Teaching Prospective Students SMDP TI RAships

EC1010: Electrical and Magnetic Circuits(Jan.-May 2014)

Instructor

- Nagendra Krishnapura

Classrooms

- CRC101

Schedule

A slot(Mo 8am, Tu 1pm, Th 11am), F slot(Fr 8am)

Teaching Assistants

Contact from your moodle page (Accessible only on IITM campus).

Evaluation

There will be four quizzes(Feb 3, Feb 24, Apr 7, Apr 25) and an end semester exam. The quizzes will count for 50-60% of the grade and the end semester exam for the remaining 40%. Tutorials held periodically will count for up to 10% of the grade.

Recorded lectures

The recorded lectures are available [here](#). You can also find lectures from previous years at the same link. The introductory lecture has information on prerequisites and references.

Tutorials

Problem sets will be posted below. You are expected to solve them on your own. You can approach the teaching assistants for

-Table of Contents

- EC1010: Electrical and Magnetic Circuits(Jan.-May 2014)
- Instructor
- Classrooms
- Schedule
- Teaching Assistants
- Evaluation
- Recorded lectures
- Tutorials
- Text book
- References
- Attendance

- <http://www.ee.iitm.ac.in/vlsi/teaching/start>
- <http://10.7.51.101/vlsi/teaching/start>

Course page on Moodle

The screenshot shows a web browser window with the URL <https://courses.iitm.ac.in/course/view.php?id=4029>. The page title is "EC1010: Electrical and Magnetic Circuits". The user is logged in as "NAGENDRA KRISHNAPURA (EE)" with a "Logout" link. The breadcrumb trail is "Home > My courses > EC1010: JAN-MAY 2014". A "Turn editing on" button is visible in the top right. The main content area lists several items: "Recorded lectures at VLSI group video lectures site", "VLSI group course homepage", "EC1010 forum", and four quizzes (Quiz I, Quiz II, Quiz III, Quiz IV). The left sidebar contains a "Navigation" section with links for "Home", "My home", "Site pages", "My profile", and "My courses". Under "My courses", "EC1010: JAN-MAY 2014" is expanded to show "Participants", "Reports", and "General". A "Settings" section at the bottom left includes "Course administration" and a "Turn editing on" button.

- <https://courses.iitm.ac.in/>

My homepage

start [VLSI group, IIT M... x | courses:ec1010_2014: x | Course: EC1010: Electr x | Nagendra Krishnapura x

www.ee.iitm.ac.in/~nagendra/

Nagendra Krishnapura

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Quick links

RECORDED LECTURES
CAD TOOLS/LIBRARIES

On this page

About Me
Research positions in our group

About me

I am an associate professor in the VLSI group of the department of [Electrical Engineering](#) of the [Indian Institute of Technology, Madras](#). I work in the area of analog and mixed-signal integrated circuits and signal processing.

I graduated with a Ph.D. from [Columbia University](#), New York in Oct. 2000. I worked at the [Columbia Integrated Systems Laboratory](#) under the guidance of [Prof. Yannis Tsividis](#) in the area of nonlinear analog signal processing for low power integrated circuits. I obtained my B. Tech. degree in electronics and communications engineering from the Indian Institute of Technology, Madras, in 1996. Between 2000 and senior design engineer at Celight, Inc. and Multilink(later Vitesse Semiconductor) where

www.ee.iitm.ac.in/~nagendra/personal.html

- <http://www.ee.iitm.ac.in/~nagendra/>