ECE543
Intro to Digital Systems

Lecture 1
Introduction

01/23/2012
Outline

- Course logistic details
- Course motivation
Where ECE543 Fits in EE Curriculum?

The image shows a curriculum map for BSEE (Bachelor of Science in Electrical Engineering), indicating the placement of various courses including ECE543: Intro to Digital Systems. The diagram outlines the progression of courses from freshman year (FR) to senior year (SR), highlighting ECE543 as a course offered in the junior year (JR). The map illustrates prerequisites and co-requisites for each course, indicating the academic pathway for students in the EE curriculum.
Course Details

- Lecture time: M, W, F, 1:10-2:00pm, N343
  - Tentative lecture calendar on syllabus

- Lab
  - Section 1: Mon. 3:10-5:00pm
  - Section 2: Wed. 3:10-5:00pm
  - Section 3: Thur. 3:40-5:30pm
  - Section 4: Tue. 3:40-5:30pm
  - Section 5: Fri. 2:10-4:00pm

- Textbook
  - How many of you have bought the textbook?
Administrative Information

- **Instructor:** Dr. Qiaoyan Yu
  - Office: Kingsbury W215
  - Email: qiaoyan.yu@unh.edu
  - Phone: 603-862-1549
  - Office hours: W 2-4pm

- **TA:** Patrick Nsengiyumva
  - Email: Patrick.Nsengiyumva@wildcats.unh.edu
  - Office hours: M/R 10am-12pm

- **Grader:** Drew Stock
  - Email: pmi36@unh.edu
  - Office hours: T 4-6pm
Grading Policy

A+: 97.5-100,  A: 92.5-97.4,  A-: 90-92.4,  
B+: 87.5-89.9,  B: 82.5-87.4,  B-: 80-82.4,  
C+: 77.5-79.9,  C: 72.5-77.4,  C-: 70-72.4,  
D+: 67.5-69.9,  D: 62.5-67.4,  D-: 60-62.4,  
F: less than 60.00

ECE543-Intro to Digital Systems
Quiz & Exam Policy

- Reinforce lecture concepts

- Quizzes
  - May NOT be announced
  - May repeat HW problems
  - Closed book, no cheating of any kind (F and referral)

- Exams
  - Exam 1, Feb.14 (Common exam time)
  - Exam 2, Apr. 4 (Common exam time)
  - Final, TBA
  - No make-up exam without a verified excuse
  - Closed book, no cheating of any kind (F and referral)
Attendance Policy

- Class lecture attendance important
  - For quizzes and participation
  - Absences must be excused before class

- Class participation critical
  - Provides feedback on learning/reading assignments
  - Generates creative discussion
  - Important questions help everybody
ECE543
Intro to Digital Systems

ECE 543 Laboratory

Prepared by:
Patrick Nsengiyumva (TA)
01/23/2013
ECE 543 labs are FUN!

- ECE 543 labs are much FUN and exciting to do.

- However, they can be a challenge, too:
  - Advantages: knowledge, skills, too much fun with the "wow, I did it" excitement.
  - Avoid procrastination and frustration.

- The TA is there to help facilitate your work and guide you.

A complete/neat lab 5 circuit
Laboratory schedule

- Monday (Section 01)/ Wednesday (Section 02), 3:10PM – 5:00PM
- Tuesday (Section 04)/ Thursday (Section 05), 3:40PM – 5:30PM
- Friday (Section 03), 2:10PM – 4:00PM

Choose a lab section which is convenient to you

Remember: First lab meeting: January 28th
(see course syllabus for details)

- TA office hours: M/R 10:00AM – 12:00PM
  Kingsbury S216
  (Also posted on the TA office door and ECE Cluster)
Prelab and lab records – Due dates

- Print your prelab and submit it in the ECE 543 mailbox by **12:00PM** of each due date

- Email a copy of your completed prelab to the TA (Patrick.Nsengiyumva@wildcats.unh.edu) by **11:59PM** of each due date

- The lab record is due at the end of the lab period

- Each lab is worth 100 %
  - Prelab report: 40 %
  - Lab record: 60%
Prelab and lab records – Equipment

- Students are to typewrite their prelab reports (No handwritten prelab work will be accepted)

- Purchase a composition notebook (available at the UNH bookstore)

- Come to the lab PREPARED: walk into lab with Prelab, Instruction Handout, and any other relevant material
Prelab and lab records – Rules and Tips

- Students with unfinished prelab reports will NOT be permitted to take the lab

- REMEMBER, your laboratory work is **worth 25 % of the overall ECE 543 grade**

- All laboratory work MUST be done individually (See the course syllabus for “cheating and plagiarism policy” and UNH Academic Integrity Policy)

- If unsure of something, **ASK for help or RESEARCH**

  “Being ignorant is not so much a shame, as being unwilling to learn.” – Benjamin Franklin
Prelab and lab records – Rules and Tips

- No Fooling Around
- No food, only water
- Check with TA before energizing circuit
- Avoid short circuits
- Use TTL and +5V settings
- Don't know? Ask!
Tips for Success

- Come to each lecture and arrive on time
- Actively participate in class activities
- Do the assigned reading and homework
  - Soon after lecture
  - Do not wait until last minute
- Review notes/assignments after class
- Ask questions if you are not sure
- Come see instructor as soon as you have difficulty with any of the material that we cover in class
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Application of Electrical Analog Signal

- In 1875, Alexander Graham Bell figured out how to change his voice into a continuously variable electrical signal, send it through a wire, and change it back to sound energy at the other end.

Today, the device that converts sound energy to an analog voltage signal is known as a microphone.
The cell phone has digital & analog components, and uses *both* types of signals.
Today’s Communication

How it works

128 kbps IP

WWW

VPN Tunnel

VPN Tunnel

Ground Gate Way

GSM MSC

PSTN/PLMN

REMOTE GATE WAY

GSM BASE STATION

DAS RAU

ROUTER

ROUTERS

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Analog Representation

- A continuously variable, proportional indicator.

- Automobile speedometer
- Mercury thermometer
- Sound through a microphone
Digital Representation

- Digital Representation—varies in discrete (separate) steps.
Recording Analog Signal

- Tape

Music tape portraits by Erika Iris Simmons
Analogy vs. Digital Systems

- Continuous variables
  - Amplitude
  - Frequency

- Discrete variable
  - ‘1’ s, ‘0’ s
  - Data Rate
Sampling for Digital Systems

- Continuous variables $\rightarrow$ discrete variables
  - Keep values of finite data points

![Analog signal – continuously varying](image1)

![Digital signal – large time divisions](image2)
Quantization in Digital Systems

Quantizing and Digitizing a Signal

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Finger Game

- One hand can represent decimal number
  0  1  2  3  4  5.

- If each of your finger works like a switch, ON or OFF, now you can use one hand to represent decimal 0-31.
  - How?
Finger Game

0 0 0 0 0₂ = 0
0 1 1 0 0₂ = 12
0 1 0 0 0₂ = 8
1 1 1 1 1₂ = 31
The End

Questions, Comments, Suggestions?