ELE 222: Introduction to Electronics

(Spring-2008)

Team

Lecturer	Teaching Assistant
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Course

CRN: 20746
Room: D5205 in FEEE
Time: Monday, 10-13

Prerequisites: None (Circuit Analysis course will be quite beneficial)

Timing

Calender: February the 4th, 2008 - May the 9th, 2008

Spring Term:

- Lectures: 12 weeks
- Exams: 2 weeks

Attendance:

- 8 Weeks Lectures + 2 Weeks Exams
- Student can not leave the room up to end of the lecture hour

Assignments are due: 1 week (unless otherwise specified), after issuing

Examination

Quizzes: Books and notebook are **closed**

Midterm and Final: Books and notebook are **closed**
Sheets of formulae will be provided during the examination.

	Midterm Exam#1	**Midterm Exam#2**	**Quiz#1**
Week#	5	10	14

Grading

ELE 222	**Quantity**	**Partial Weight**	**Total Weight**
Midterm Exam	2	20%	40%
Quizzes	1	8%	8%
Assignments	3	4%	12%
Ethics	1	+5%	+5%
ABET Paper	For each	+1%	
Final	1	40%	40%

Overall Class Assessment: Bell Curve System

Aim of Course

Introducing the basic principles of semiconductor devices and their various circuit applications

Course Objectives

At the end of the course, students should:

- understand clearly the basic principles of semiconductor devices.
- be able to Analysis/Design basic amplifier circuits.
- understand clearly the basic blocks of digital circuits.

Tentative Outlines

- **Lecture#1: Electronic Components:** RLC Standards
- **Lecture#2: Diode:** Terminal properties; Various applications.
- **Lecture#3: Semiconductor Basics::** Terms; Doping; Conductivity, Electron Transport
- **Lecture#4: PNJ::** Physical Foundations; Equilibrium and Non-Equilibrium Properties
- **Lecture#5: MOSFET::** Foundations; Operation Modes; Equivalent Circuits
- **Lecture#6: MOSFET::** Depletion Types; Operation Modes; Terminal Characteristics; Secondary Effects
- **Lecture#7: MOSFET::** Amplifier Topologies; DC Biasing; AC Equivalents; AC Specifications
- **Lecture#8: MOSFET::** Derivation of Amplifiers AC Specs: V Gains; Input and Output Resistances
- **Lecture#9: BJT::** Foundations; Operation Modes; Terminal Characteristics, Secondary Effects
- **Lecture#10: BJT::** Amplifier Topologies; DC Biasing; AC Equivalents; Specifications
- **Lecture#11: BJT::** Derivation of Amplifiers AC Specs; Multistage Amplifiers
- **Lecture#12: OpAmp::** Foundations; Analyse techniques; and its various applications.
- **Lecture#13: Basic Logic Circuits:** Introducing basic logic elements in descriptive level. (Handout)

Text Book

Sedra, A. S., and Smith, K. C., Microelectronic Circuits, 4th Ed., Clarendon: Oxford Univ. Press, 1998.

Ancillaries

Software

- SPICE (Generic)
- OrCad (http://www.orcad.com)
- Electronics Workbench (http://www.electronicsworkbench.com)

Academic Ethics

All assignments should be student own work. Simply copping someone else's homework is **unethical**. It will be considered as **cheating**. All kind of cheating will be punished.

- Students are encouraged to discuss the problems together.
- It is responsibility of each student to save his/her work.
- Cheating in any work brings **zero** point
- Signing in for someone else drops lecture visa

Dissection of Ethics Points(+5%)

- Original HWs 30%
- Original Exams: 40%
- Attendance: 30%

Bibliography

Circuit Oriented Books:

[1] Horenstein, Mark N., *Microelectronic Circuits and Devices*, NJ: Prentice-Hall, 1990.

[2] Millman, Jacob, Halkias, C C, *Integrated Electronics: Analog, Digital Circuits and Systems*, NY: McGraw-Hill, 1972.

[3] Fonstad, Clifton G., *Microelectronic Devices and Circuits*, Singapore: McGraw-Hill, 1994.

[4] Turkoz, M. Sait, *Elektronik Devreleri*, 2.Baski, Istanbul: Sistem,1992.

[5] Turkoz, M. Sait, *Temel Elektronik*, Istanbul: Sistem,1993.

[6] Cilingiroglu, U. *Lecture Notes on Electronic Circuits* (unpublished manuscript)

[7] Leblebici, D, *Elektronik Devreleri*, Istanbul: Istanbul Technical University Press, 2002.

Device Physics Oriented Books:

[8] Leblebici, D, *Elektronik Elemanlari*, Istanbul: System, 2002.

[9] Streetman, Ben G., *Solid State Electronics Devices*, 4th Ed., NJ: Prentice-Hall,1995.

[10] Yang, Edward S., *Microelectronic Devices*, Singapore: McGraw-Hill, 1988.

[11] Sze, S. M., *Physics of semiconductor Devices*, 2nd Ed., Singapore: Wiley, 1981.

SPICE Books:

[12] Herniter, M. E, *Schematic Capture with Microsim Pspice*, 2nd Ed, NJ: Prentice-Hall, 1996.

[13] Rashid, M., *SPICE for Circuit and Electronics Using Pspice*, 2nd Ed, NJ: Prentice-Hall, 1995.

[14] Hossain, A, *Computer-Aided Electronic Circuit Design and Fabrication*, NJ: Prentice Hall, 1996.

[15] Krol, P. G, *Inside OrCAD Capture*, NM: OnWord, 1998.