

**KATHMANDU ENGINEERING COLLEGE**  
**Department of Electronics, Computer and Electrical Engineering**  
**II Year II Semester**  
**BEX Section A**  
**Electronic Circuits I (EG 572 EX) Course Introduction**

Course Instructor: **Ajay Kumar Kadel (AK)**  
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Course Homepage: [www.courses.esmartdesign.com](http://www.courses.esmartdesign.com)  
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Class hours:

Classroom: As designated by the department

**COURSE SCOPE AND OBJECTIVES:**

This course is designed to teach students the essentials of fundamental electronic circuits. The course is focused to extend the students' knowledge and skill in the understanding of practical electronic circuits. Concepts and devices covered in earlier courses such as semiconductor devices will be consolidated. In addition to this new devices will be examined in practical circuit applications. The course exposes students to the issues regarding the analysis and synthesis of electronic circuits.

The class is designed so that students immediately apply the concepts learned in class to solve a variety of problems. This course will appeal to students who have an immediate or future interest in electronic circuits' analysis and synthesis. This course is **very important** in the sense that this course builds the foundation for further courses like Electronic Circuits II, filter design and project works.

**CLASS PARTICIPATION:**

This course requires substantial and informed student participation. This course is best learned through problem solving. The productivity of this course will also be based upon students' ability and willingness to

- Volunteer responses that are both informative and relevant to 'open' questions posed by the instructor
- Interact and question other students and instructor in a matured and constructive manner
- Provide and substantiate their opinions and comments when called upon by the instructor

**ADVICE AND ASSISTANCE**

You are encouraged to come up with your questions, suggestions or feedbacks regarding the course. I will be happy to talk to students and help them out to the best of my knowledge. Students are responsible for contacting the instructor when having trouble understanding the material or requirements of the course. If no question/query comes up, I presume that everyone has understood everything. I am available during class hours and at the Faculty Room during the off hours. You can make a visit directly and no prior appointment is necessary whatsoever.

**ASSIGNMENT POLICY**

You will be assigned different genres of problems during the course of the semester. This will help you to get the first hand experience on problem solving and also to prepare for the end semester examinations conducted by IOE. Please try to do the problems by yourself, since I believe that this material is best learned through problem-solving. However, In case you get bogged down I have no

objections with you asking for help, from your friend or anybody but I do expect you to understand what you hand in. Please promptly turn in your assignments. One of the most valuable lessons you will learn in your undergraduate engineering course is to **deliver the goods on time**.

### **KNOWLEDGE SHARE SEGMENT**

Going beyond required participation, the students may be required to do up to a ten-minute **presentation** relevant to the course material. Doing a Knowledge-Share Segment will earn bonus points toward your internal assessment score.

### **EVALUATIONS:**

Internal Evaluation: 20 marks (As per the department guidelines)

External Evaluation: 80 marks (Conducted by IOE)

### **COURSE OUTLINE**

#### **Chapter 1 INTEGRATED CIRCUIT TECHNOLOGY AND DEVICE MODELS**

The planar process for IC fabrication, Review of dc and ac models for diode, JFET, BJT, MOSFET

#### **Chapter 2 OPERATIONAL AMPLIFIER CIRCUITS**

Bias circuits suitable for IC design, The widlar current source, The differential amplifier, Active Loads, Level shifting, Output stages

#### **Chapter 3 OPERATIONAL AMPLIFIER CHARACTERIZATION**

Input Offset Voltage, Input bias and Input Offset currents, Output impedances, Differential and common-mode input impedances, DC gain, bandwidth, gain-bandwidth product, Common-mode and Power supply rejection ratios, Frequency compensation, Slew rate, Noise in operational amplifier circuits

#### **Chapter 4 POWER SUPPLY AND VOLTAGE REGULATORS**

Half-wave and full wave rectifiers, Capacitive filtering, Zener diodes, bandgap reference, constant current diodes, Voltage regulators, Series regulators, Series transistor-zener diode-constant current diode voltage regulators, Voltage regulators with feedback, IC voltage regulators

#### **Chapter 5 UNTUNED AND TUNED POWER AMPLIFIERS**

Amplifier Classification, Class B amplifier operation, Transformer-coupled push-pull stages, Tuned power amplifiers, Power dissipation considerations

#### **Chapter 6 OSCILLATOR CIRCUITS**

CMOS inverter relaxation Oscillator, Operational amplifier based relaxation oscillators, Voltage to frequency converter, Sinusoidal oscillators, Amplitude and frequency stabilization, Signal generator, frequency synthesizers and swept frequency oscillators.

### **REFERENCES**

I will provide you with all the necessary notes, handouts, tutorials and assignments that are relevant to my portion of the course. However, it doesn't imply that these materials are sufficient to fully understand the course. You are encouraged to read the following text(s) and materials to build a solid understanding of the course.

1. **Jyoti Tandukar *Course Manual of Electronic Circuits I*, IOE**
2. **Adel S. Sedra, Kenneth C. Smith *Microelectronic Circuits*, Harcourt Brace College Publishers.**
3. T.Bogart, J. Beasley and G.Rico *Electronic Devices and Circuits*, Prentice Hall of India
4. R.L. Boylestead, L. Nashelksy *Electronic Devices and Circuit theory*, Prentice Hall of India