~~CURRICULUM REVIEW - 2017~~
~~Part IV - Course Outline~~

Asian Institute of Technology
School of Engineering and Technology

AT74.04 – Digital and Analog Circuit Design 3(2-3) **Semester: August**

Course Objective:

Electronic circuits have been extensively used across many sectors. ~~However,~~ S~~s~~uch circuits could be analyzed and categorized in ~~–~~to generalized circuit blocks. The o~~O~~bjective of this course is to impart the knowledge ~~and the experiences~~ of circuit design using circuit blocks, ~~such that~~which will enable the students ~~are expected~~ to apply the knowledge in a range of applications.

Kommentar [p1]: Agreed to revises

Learning Outcomes:
Upon completion of this course, the students would be able to:

- Analyze a given circuit block ~~in terms of~~and its functionality
- Troubleshoot a given circuit
- Design a circuit by integrating functional circuit blocks
- Design interfacing circuits to sensors, actuators and controllers

Kommentar [p2]: Agree to revises

Prerequisites: None

Course Outline:

I. Diode Circuits

1. Rectifiers and power supplies
2. Voltage multipliers, clippers and clampers
3. Special diodes and applications
4. Protective circuits with diodes

II. Biasing of transistors

1. Biasing of transistors
2. Common Emitter biased circuits
3. Common Collector biased circuits
4. Common Base biased circuits

III. AC amplifiers using BJTs

1. Amplifier waveforms
2. Coupling and Bypass capacitors
3. Cascading of AC amplifiers circuits

4. Feedback in AC amplifiers
5. Amplifier classes

IV. Amplifier Types

1. Voltage amplifiers
2. Current amplifiers
3. Trans impedance amplifiers
4. Trans admittance amplifiers

V. Switching circuits

1. BJT based switching
2. Relays and limit switches
3. MOSFETs and JFETS

VI. OP-Amp Circuits

1. Op-amp approximations and circuit analysis
2. Realization of mathematical functions using op-amps
3. Realization of PID based feedback circuits using Op-Amp
4. Active filters
5. Timers and oscillators

VII. Interfacing circuit design with sensors, actuators and controllers

1. Voltage matching
2. Impedance matching
3. Analog to digital conversion
4. Digital to analog conversion
5. Pulse Width Modulation
6. H bridge circuits

VIII. Digital Circuits

1. Logic gates
2. Boolean algebra
3. Karnaugh map based simplification

Laboratory Sessions:

- Power Supplies
- Diodes and protective circuits
- Common Emitter Based Biasing
- AC Amplifiers
- Switching Circuits
- Op-Amp based timers
- JFETs and MOSFETs

Learning Resources

Textbooks: No designated text book, but class notes and handouts will be provided

Reference Books:

1. D.Bates, A. Malvino, Electronic Principles, McGraw-Hill Education, 2015
2. D.Bob, J. Williams, Analog Circuit Design: a Tutorial Guide to Applications and Solutions, Elsevier/Newnes, 2011.
3. P. Wilson, The Circuit Designer's Companion, Newnes, 2017

Journals and Magazines:

1. Transactions on Industrial Electronics, IEEE
2. Transactions on Mechatronics, IEEE/ASME
3. Spectrum, IEEE

Teaching and Learning Methods: Methods used are lectures, laboratory work and assignments which include presentations and conducting computer simulations.

Time Distribution and Study Load:
Lectures: 30 hours
Laboratory sessions: 45 hours
Self study and assignments: 90 hours

Evaluation Scheme: Mid semester examination (20%), final examination (40%) (both are closed book), laboratory sessions (20%) and assignments (20%).

In the evaluation, an "A" will be awarded if a student demonstrates an excellent level of understanding of the principles and demonstrates the creativity in the subject. "B" will be awarded if a student demonstrates an average level of understanding of the principles and demonstrates average capabilities. "C" will be given if a student demonstrates below average level of understanding of the principles and demonstrates below average level of capabilities in Electronics related applications.

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