NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF ELECTRICAL AND ELECTRONIC ENGINEERING

ELECTRONICS ENGINEERING PROGRAM

EE422 – ELECTRONIC CIRCUITS II

I. GENERAL INFORMATION

CODE	**:**	EE422 – Electronic Circuits II
SEMESTER	**:**	7
CREDITS	**:**	04
HOURS PER WEEK	**:**	05 (Theory – Practice)
PREREQUISITES	**:**	EE421 – Electronic Circuits I EE112 – Analysis of Electrical Circuits II
CONDITION	**:**	Mandatory

II. COURSE DESCRIPTION

The course trains the student in the analysis and design of power amplifiers and linear amplifier circuits with discrete and integrated structures used in instrumentation, control and general electronics in low and high frequency.

III. COURSE OUTCOMES

At the end of the course the student will:

- Have the basic concepts of feedback and its application in electronic control and amplification systems in power networks
- Process analog signals according to nature (control, bio-measurements and general purposes).
- Process signals by applying analog filtering techniques as the application requires.
- Design and analyze resonant networks and transformers in small signal.

IV. LEARNING UNITS

1. **FEEDBACK**
   General concepts. Stability. Compensation. Barkhausen criteria. Applications.

2. **DIFFERENTIAL AMPLIFIER**
   Polarization by current mirrors. Basic Model Transfer function for AC and DC signals. Transconductance, gain, differential impedance and common mode, CMRR.

3. **COMPLEMENTARY SYMMETRIC POWER AMPLIFIER**
   Power and efficiency relationships. Thermal considerations. Protection. Heatsink selection. Applications and design.

4. **OPERATIONAL AMPLIFIERS**
   Basic aspects. Study of IC 741. Impedance and symmetry criteria. Design. Active filters General Applications

5. **INSTRUMENTATION AMPLIFIER**
   Basic models. Commercial models. Applications.

6. **INSULATION AMPLIFIER**
   Function description and specifications. Commercial models. Applications.

7. **OTA TRANSCONDUCTANCE AMPLIFIER**
   General concepts. Basic Model. Commercial OTA. Multiplier based on OTA. OTA application in PLL circuits.

8. **TUNED CIRCUITS IN SMALL SIGNAL**
   Resonant networks of single and double tuning. Capacitive transformer, inductive transformer and autotransformer. Design criteria for tuning networks. Admittance model. Regeneration coefficient, stability, gains and frequency response of the tuned amplifier. Applications.

V. LABORATORIES AND PRACTICAL EXPERIENCES

The course is complemented by a two-hour weekly session of practices aimed at strengthening the criteria for detecting and solving engineering problems from the formal side.

VI. METHODOLOGY

The course is developed in sessions of theory, practice. In the theory sessions, the teacher presents the engineering problems and the theoretical criteria that involve various proposals to solve them. In the practical sessions, various engineering problems are solved and the solution methodology is proposed. In all sessions the active participation of the student is promoted.

VII. EVALUATION FORMULA

The learning will be evaluated through the "G" system.

- Partial Exam (PE): Weight 1
- Final Exam (FE): Weight 2
- Average of Practices (P): Weight 1.

$$FA = \frac{PE + 2 * FE + P}{4}$$

During the semester, 04 qualified practices will be taken, and the one with the lowest grade is eliminated.

VIII. BIBLIOGRAPHY

- CHARLES HOLT, "DIGITAL AND ANALOG ELECTRONIC CIRCUITS", VOLUME II.
- W. HETTERSCHEID, "BAND PASS AMPLIFIERS".
- CARLOS MEDINA, "ELECTRONIC CIRCUITS" – LINEAR AMPLIFICATION.