BIRZEIT UNIVERSITY

Faculty of Engineering and Technology
ENEE, Electrical Engineering
Second Semester 2024/2025

SYLLABUS

Course number and name: ENEE 2315 – Network Analysis 2

Credits and contact hours: Credit: 3 (Lecture: 3, Lab.: 0)

Instructor's or course coordinator's name: Dr. Jaser Sa'ed

- **Office**: Masri221, email: jsaed@birzeit.edu

Textbooks:

- James W. Nilsson and Susan A. Riedel, "Electric Circuits", 10th Edition, Prentice Hall, 2015
- R. E. Thomas, A. J. Rosa, and G. J. Toussaint, "The Analysis and Design of Linear Circuits", 6th Edition, Wiley, 2009.

Specific course information

- **Description**: Operational amplifier, Laplace transform analysis and circuit application, network functions, frequency selective circuits, Active filters analysis and design, two port networks, circuit topology and general circuit analysis, Using simulation tools for analysis and design of electric circuits.
- **Prerequisites:** ENEE2301: Network Analysis 1 and EE2302 concurrent: Signals and Systems
- Core course for Electrical Engineering

Specific goals for the course

Upon the successful completion of this course a student should be able to do the following:

- Solve circuits with ideal operational amplifiers.
- Understand basic operational amplifiers applications.
- Apply the linear network analysis methods in the Laplace domain, (mesh analysis, node analysis, network theorems and circuits transformation).
- Apply the circuit synthesis methods in the implementation of LTI systems (transfer functions).
- Understand two ports elements representation.
- Solve circuits with two ports elements.
- Determine and analyze the frequency response of the systems.
- Analyze different types of analog filters (active and passive).
- Design and implement different types of analog filters.
- Understand the graph representation of electric networks.
- Apply the graph theory concepts in solving electric networks.
- Use PSPICE and MATLAB tools in simulating and synthesizing electric networks.

(ABET) Relationship of course to Electrical Engineering Program Student Outcomes:

- (a) Ability to apply mathematics, science and engineering principles.
- (c) Ability to design a system, component, or process to meet desired needs.
- (e) Ability to identify, formulate and solve engineering problems.
- (k) Ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

Brief list of topics to be covered

- Operational amplifiers and their various applications
- Introduction to Laplace transforms.
- Laplace transforms analysis and circuits application.
- Network Functions.
  - Definition of a network function.
  - Properties of a network function.
  - Network function of one and two-port circuits.
  - Network function design.
- Frequency Selective Circuits.
  - Low-pass filters.
  - High-pass filters.
  - Bandpass filters.
  - Bandreject filters.
- Active Filters Analysis and Design.
  - First-order low-pass and high-pass filters.
  - Op Amp bandpass and bandreject filters.
  - Higher order Op Amp filters.
  - Narrowband bandpass and bandreject filters.
- Two-Port Circuits.
  - The terminal equations.
  - The two-port parameters.
  - Analysis of the terminated two-port circuit.
  - Interconnected two-port circuits.
- Network graphs, Loop and Cut-set Analysis. (If time permits)
  - The concept of a graph.
  - Cut set and Kirchhoff's current law.
  - Loops and Kirchhoff's voltage law.
  - Node and mesh analysis.
  - Fundamental theorem of graph theory.
  - Loop analysis.
  - Cut-set analysis.

Tentative Grading:

- First and Second Exams 45 %
- Final Exam 40 %
- Activities/Quizzes/Assignments 15 %

Policies:

- No late submissions will be accepted.
- Class attendance is required by the university regulations. Come to All lectures and activities.
- Make-up will be allowed only for students who miss the final exam with an acceptable excuse according to the university regulations.
- All students are expected to comply with University rules and regulations on academic Integrity and honesty.