



**MUTAH UNIVERSITY**  
**Faculty of Engineering**  
**Department of Electrical Engineering**



**Course Syllabus**  
**Study Plan 2017: Communication Track**

Course Code	Course Name	Credits	Contact Hours
0401215	Networks Synthesis and Filters	3	3 T

INSTRUCTOR/COORDINATOR	
<b>Name</b>	Dr. Amneh Al-Mbaideen
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<b>Office Hours</b>	

TEXTBOOK	
<b>Title</b>	1. "Analog And Digital Filters: Design And Realization," HARRY Y-F. LAM. Prentice-Hall, Inc
Other Supplemental Materials	
<b>Title</b>	1. "Network Analysis and Synthesis," F. F. Kuo, Wiley international Edition, 2008. 2. "Network Analysis And Synthesis," Singh, Mc Graw Hill India, 2013. 3. "Principles of Active Network Synthesis & Design," GobindDaryanani, John Wiley 2003 4. "Analog Filter Design", M.E. Van Valkenberg, Harcourt Brace Jovanovich College Publishers. 5. "Network Analysis and Synthesis," CL Wadhwa, New Age International Publishers.

SPECIFIC COURSE INFORMATION
<b>A. Brief Description of the Content of the Course (Catalog Description)</b>

This course provides the principles for Network analysis and design and Analog filters: Circuit components, Network Function, Hurwitz Polynomial, Positive Real (PR) Functions, and their properties. Properties and realization of RC, RL, and LC Driving points. Completion of Transfer functions. Passive filter approximation; The Butterworth Approximation, the Chebyshev Approximation, the Bessel Approximation, and the Bessel Approximation. Frequency scaling and network transformations. Active Filters; Direct Realization Approach and Cascade Realization Approach.

**B. Pre-requisites (P) or Co-requisites (C)**

Signals and Systems (0401208) (P), Electric Circuits 2 (0401212) (P)

**C. Course Type (Required or Elective)**

Required

**SPECIFIC GOALS**

**A. Course Learning Outcomes (CLOs)**

**CLO1:** Understand the importance of the frequency domain in the analysis of the Analog filters and networks [1].

**CLO2:** Understand the concepts of the basic building blocks used in the implementation of the Analog filters [1].

**CLO3:** Understand the Properties of Network Functions [1].

**CLO4:** Understand the concepts of Positive Real Functions and Passivity. [1].

**CLO5:** Understand the properties and Realizations of Lossless, RL, and RC Driving-Point Functions [1]

**CLO6:** Understand the methods of Passive Realization of Transfer functions [1].

**CLO7:** Understand the Filter Approximation concepts; Basic properties, Transfer function, and Circuit realization [1]

**CLO8:** Understand the concepts of frequency and network transformations and impedance scaling.

**CLO9:** Understand the concepts of the Active filters [1]

**CLO10:** Provide students with the essential tools for designing Passive filter, Active filters, RC and LC networks [2].

**B. Student Learning Outcomes (SOs) Addressed by the Course**

1	2	3	4	5	6	7
✓	✓					

**BRIEF LIST OF TOPICS TO BE COVERED**

List of Topics	No. of Weeks	Contact Hours
Chapter 1: Introduction	0.66	2
Chapter 2: Building Blocks	0.34	1

Chapter 3: Properties Of Network Functions	1	3
Chapter 4: Positive Real Functions And Passivity	1	3
Chapter 5: Properties And Realizations of Lossless Driving-Point Functions	1	3
Chapter 6: Properties And Realizations Of Passive Rc Driving-Point Functions	2	6
Chapter 7: Passive Realization Of Transfer Functions	2	6
Chapter 8: Filter Approximation	3	9
Chapter 10: Active Filters	3	9
<b>Total</b>	<b>14</b>	<b>42</b>

<b>EVALUATION</b>		
<b>Assessment Tool</b>	<b>Due Date</b>	<b>Weight (%)</b>
Mid Exam	According to the university calendar	30
Course Work (Homeworks, Quizzes, Projects, ...etc.)	One week after being assigned	20
Final Exam	According to the university calendar	50

<b>ABET's Students Learning Outcomes (Criterion # 3)</b>		
<b>Relationship to program outcomes</b>		
<b>ABET 1-7</b>	<b>Engineering Student Outcomes</b>	
1	√	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2	√	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3		an ability to communicate effectively with a range of audiences.
4		an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5		an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6		an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7		an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

