

National Changhua University of Education 106-2

Syllabus & Course Schedule

Course : Microwave Filter Design

Course Number : 57001 (1EICE2102830)

Instructor : 李清和

Credit : 3 Hour(s); 3 Credit(s)

Course Type : Requirement Optional

Full English : YES NO

Teaching evaluation questionnaire : (8)

1. Lectures
2. Discussion
3. Practicum (Education or Management)
4. Practicum (Science or Engineering)
5. Laboratory course
6. Physical activity course
8. General course
9. Practicum/Laboratory course
10. Physical activity course

Teaching mode : (0)

0. Classroom instruction
1. Practice workshop
2. Distance learning (Synchronous)
3. Distance learning (Asynchronous)
4. Classroom & group discussion
8. Classroom & Assisted distance learning (Synchronous or Asynchronous)
9. Other (Such as sports, education, internship or experimental course)

<PS. Classroom & group discussion. Definition: The total hours of discussions exceeds one third of total class hours.>

Immersing the following issues or contents :

(none)

Objective :

To provide a solid background in microwave filter design, including fundamental principles, software design tools, and practical implementation.

Outline :

1. Microwave network analysis
2. Basic concepts and theories of filters
3. Transmission lines (microstrip, CPW, slot lines) and components
4. Lowpass and bandpass filters
5. Highpass and bandstop filters
6. Coupled resonators and their applications for filter design
7. Compact filters and filter miniaturization
8. Uniplanar filters, selected topics from journal papers

Required reading of Masterpiece :

☆ Main materials :

1. J. –S. G. Hong and M. J. Lancaster , Microstrip filters for RF/microwave applications , John Wiley & Sons , Inc. , 2nd ed. , 2011.
2. R. Schaumann and M. E. Van Valkenburg , Design of Analog Filters , Oxford University Press , 2001.

☆ Reference materials :

1. G. Mattaei , L. Young , and E. M. T. Jones , Microwave filters , impedance matching networks , and coupling structures , Artech House , Norwood , MA , 1980.
2. David. M. Pozar , Microwave Engineering , 3rd Edition , John Wiley & Sons , Inc. , 2004.
3. Richard J. , Cameron , Raafat Mansour , and Chandra M. Kudsia , Microwave Filters for Communication Systems , John Wiley & Sons Inc. , 2007.
4. Selected papers from IEEE Transactions on Microwave Theory and Techniques , IEEE Microwave and Wireless Component Letters , and other related journals.

<PS. Do not make copies illegally. >

☆ Course pre-requisites : Electromagnetics , Microwave Engineering

☆ Recommended reading :

Online materials :

Teaching methods :

Method
Lecture
Exercise
※ Teaching methods Memo : (none)

Scoring methods :

Method	%
Mid-term exam	40%
Written report	30%
Homework	30%
※ Scoring methods Memo : (none)	

The development of core ability :

Core Ability	Correlation
(M) 使學生具有扎實的電信專業知識	10
(M) 使學生具有執行工程實務所需之技術以及使用軟、硬體工	8
(M) 使學生具有策劃及執行專題研究與撰寫專業論文的能力	8
(M) 使學生具備創新思考與獨立解決問題之能力	7
(M) 使學生具備有效的溝通與團隊整合之能力，並培養領導、	6
(M) 培養學生具有基本的外語能力以及良好的國際觀	7
(M) 使學生理解專業倫理及社會責任，並瞭解工程技術對環境	4

<B: Bachelor's degree; M: Master's degree; D: doctor's degree>

Course Schedule

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Course Number : 57001 (1EICE2102830)

Course : Microwave Filter Design

Class Time & Classroom : (一) 02-04 E414

Weekly Calendar :

Week	Date	Teaching Chapter	Before Class Preparation	Homework / Exam / Notes
1	02/26	Network analysis, network variables, scattering parameters		
2	03/05	Z, Y, and ABCD parameters and their conversions		
3	03/12	Transmission line networks, network connections, multi-port networks, multi-mode networks		1st homework
4	03/19	Basic concepts and theories of filters, transfer functions, the poles and zeros on the complex plane, various filter function responses		
5	03/26	Lowpass prototype filters and elements, butterworth, Chebyshev, elliptic function, Gaussian, all-pass, etc.; Frequency and Element Transformations		2nd homework
6	04/02	Immittance inverters, Richard's transformation and Kuroda identities, dissipation and unloaded quality factor		
7	04/09	Transmission lines and components, microstrip lines, slot lines, CPW; coupled Lines		3rd homework
8	04/16	Lowpass and bandpass filters: Stepped-impedance L-C ladder type lowpass filters, L-C ladder type of lowpass filters using open-circuited stubs, semilumped lowpass filters having finite-frequency attenuation poles		

9	04/23	Microstrip-line and coupled-resonator type bandpass filters		期中考 (Mid-term)
10	04/30	Highpass filters		
11	05/07	Bandstop filters		4th homework
12	05/14	Coupled resonator circuits : General coupling matrix, theory of couplings		
13	05/21	Formulation for extracting coupling Coefficient, formulation for extracting external quality factor		
14	05/28	Compact filters and filter miniaturization, ladder line filters, pseudo interdigital line filters		
15	06/04	Miniature open-loop and hairpin resonator filters, miniature dual-mode resonator filters		5th homework
16	06/11	Multilayer filters, miniaturized filters using high dielectric constant substrates		Term project
17	06/18	Multi-band bandpass filter design, UWB bandpass filter design		
18	06/25	Balanced bandpass filter design		
※ Course Content Memo : (none)				