

ECE 697KK: Microwave Hardware Systems Engineering

Department of Electrical & Computer Engineering

University of Massachusetts

Spring 2017

Purpose:

To explore concepts related to the design, analysis, and construction of microwave systems. This course will discuss the fundamental tradeoffs governing system design: the hardware components and technologies that comprise working systems, the models used for characterizing the transmission and reception of signals, the physics of wave propagation and interaction, and estimation theory which seeks to separate signals from sources of error and guide algorithms for extracting information from received signals.

Time & Place: TR 4:00 pm – 5:15 pm in ELab 305

Stephen J. Frasier

Knowles Engineering Bldg., Rm. 113A

email: frasier@umass.edu (please include ECE-686 in the subject)

Office hours: By appointment.

Prerequisites: Undergraduate background in electromagnetic fields, probability and random processes, and signals and systems.

Required Text:

None.

Reference Texts (not required):

Microwave Engineering, Pozar, 4rd Ed. Wiley.

Communication Systems, Haykin, 4th Ed., Wiley.

Computer Requirements: Access to a scientific analysis and plotting package such as Matlab, IDL, Mathematica, Python, or whatever you like.

Course Grading:

Homework: 30%

Midterm: 30%

Final Project: 40%

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Spring 2017 - Preliminary Schedule

Week	Beginning	Topic
1	T Jan 24	Introduction, ROC, Speed Trap Example
2	T Jan 31	Communications, Probability of Error
3	T Feb 7	Receiver Architectures
4	T Feb 14	Complex (Analytic) Signals
5	T Feb 21	Link Budget Analysis
6	T Feb 28	Propagation Modeling, Fading
7	T Mar 7	Noise Analysis
	T Mar 14	*Spring Break*
8	T Mar 21	Midterm Quiz, Mixers and Noise
9	T Mar 28	A/D Converters, Quantization
10	T Apr 4	Distortion and Dynamic Range
11	T Apr 11	System Design Example
12	R Apr 20	Automatic Gain Control
13	T Apr 25	Phase Noise and Jitter
14	T May 2	Transmitters
	TBD	FINAL EXAM