

# ECE 7003: Wireless Communication Theory

## Course Description

Theory and analysis of wireless communication systems. Topics include: multipath fading channels; modulation, equalization, and coding for fading channels; MIMO systems; capacity calculations.

**Prior Course Number:** ECE807, ECE809

**Transcript Abbreviation:** Wireless Comm Thry

**Grading Plan:** Letter Grade

**Course Deliveries:** Classroom

**Course Levels:** Graduate

**Student Ranks:** Masters, Doctoral

**Course Offerings:** Autumn

**Flex Scheduled Course:** Never

**Course Frequency:** Odd Years

**Course Length:** 14 Week

**Credits:** 3.0

**Repeatable:** No

**Time Distribution:** 3.0 hr Lec

**Expected out-of-class hours per week:** 6.0

**Graded Component:** Lecture

**Credit by Examination:** No

**Admission Condition:** No

**Off Campus:** Never

**Campus Locations:** Columbus

**Prerequisites and Co-requisites:** Prereq: 6001 (804).

**Exclusions:** Not open to students with credit for 807 or 809.

**Cross-Listings:**

**Course Rationale:** Existing course.

**The course is required for this unit's degrees, majors, and/or minors:** No

**The course is a GEC:** No

**The course is an elective (for this or other units) or is a service course for other units:** Yes

**Subject/CIP Code:** 14.1001

**Subsidy Level:** Doctoral Course

## Course Goals

Develop mathematical theory and engineering practice of digital communications over fading channels
Learn channel modeling techniques for fading channels
Learn modulation and equalization techniques for mobile radios
Learn analysis and design of multi-channel techniques for communication over fading channels
Learn methods and interpretation of capacity calculations

## Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Wireless communication systems	2.0							
Wireless channel modeling	3.0							

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Capacity and fundamental limits	6.0							
Modulation, equalization and coding techniques for wireless communications	12.0							
Multi-access, broadcast, and interference management	8.0							
MIMO Systems	8.0							

## Grades

Aspect	Percent
Problem Sets	10%
Midterm exam	20%
Project	20%
Final Exam	50%

## Representative Textbooks and Other Course Materials

Title	Author
<i>Fundamentals of Wireless Communication</i>	David Tse and Pramod Viswanath

## ABET-EAC Criterion 3 Outcomes

Course Contribution		College Outcome
***	a	An ability to apply knowledge of mathematics, science, and engineering.
*	b	An ability to design and conduct experiments, as well as to analyze and interpret data.
***	c	An ability to design a system, component, or process to meet desired needs.
	d	An ability to function on multi-disciplinary teams.
***	e	An ability to identify, formulate, and solve engineering problems.
	f	An understanding of professional and ethical responsibility.
	g	An ability to communicate effectively.
	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
*	i	A recognition of the need for, and an ability to engage in life-long learning.
	j	A knowledge of contemporary issues.
***	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

## Additional Notes or Comments

Updated course description, prereqs, exclusion, and goals to match university format.

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