

# Syllabus

## Advanced Digital Communications

Course Name	Course type (credit/hours)		전선(3/3)			Course code	
	Target students Division/major/grade		/			Opening semester	
	Class time and classroom						
Reference to this course	Related basic courses						
	Recommended concurrent courses						
	Related advanced courses						
Instructor	Name (title/division)						
	Office Room Number		Office phone Number	2375	e-mail	sunnyran@ajou.ac.kr	
	Office hours		Homepage address				
Teaching Assistant	Name (title/division)						
	Office Room Number		Office phone Number		e-mail		

### 1. Introduction

This course is a graduate level introduction to the basic principles of digital communication systems. This course aims at letting students learn how to modulate digital data by continuous-time signals, analyse digital communications by using signal processing and random process concepts and design optimum or suboptimum receivers for digital communications and analyse their performance. The course would be beneficial particularly to students who are interested in doing research in fields related to communications, networks, and signal processing.

### 2. Course Objectives

### 3. Class types and activities

#### 4. Teaching Method

1. Lecture
2. Discussion
3. Presentation

#### 5. Knowledge and ability required for taking this course

#### 6. Method of Evaluation

Evaluation Item	The Number of Times	Evaluation Proportion	Remarks
Attendance			
midterm exam			
final exam			
quiz			
presentation			
discussion			
homework			
etc			

1. Projects (20%)
2. Homework (10%)
3. Midterm Exam (35%)
4. Final Exam (35%)

## 7. Textbooks

Main/Sub	Title	Writer	Publisher	Publication year
부교재	Digital Communications	B.Sklar	McGraw-Hill	2001
참고자료	Contemporary Communication Systems using Matlab	J. G. Proakis	Cengage Learning	2012
참고자료	Detection Estimation and Modulation Theory	H. L. Van Trees	Wiley	2013
주교재	Digital Communications	J. G. Proakis	McGraw-Hill	2007

## 8. Lecture Schedule

Week	Lecture contents	Lesson type	Remark
1	Bandpass and low-pass signal and system representation	lecture	
2	Signal space and vector space concepts	Lecture	
3	Digital Modulation Schemes	Lecture	
4	Optimum Receivers_ideal AWGN Channel	Lecture	
5	Optimum Receivers_Random Channel phase, gain	Lecture	
6	Optimum Receivers_Multipath channel with known/unknown channel gain	Lecture	
7	Relevant paper study	Discussion	
8	Midterm		
9	Band-limited Channel_signal design	Lecture	
10	Band-limited Channel_Optimal receiver, ML etc	Lecture	
11	Band-limited Channel_Linear equalizer (MMSE and ZF)	Lecture	
12	Fading Channel	Lecture	
13	MIMO & Multiuser Communications	Lecture	
14	Project presentation_1	Presentation	
15	Project presentation_2	Presentation	
16	Final Exam		

## 9. Others

1. Mathematical background on Probability and Random Process is required
2. Matlab