ET1335
Introduction to Electronic Communications Systems
[Onsite]

Course Description:

This course introduces fundamental concepts and principles in electronic communications systems. A laboratory provides practical experience using both physical components and computer-generated simulations.

Prerequisite(s) and/or Corequisite(s):

Prerequisites: ET1215 Basic Electronics or equivalent

Credit hours: 4.5

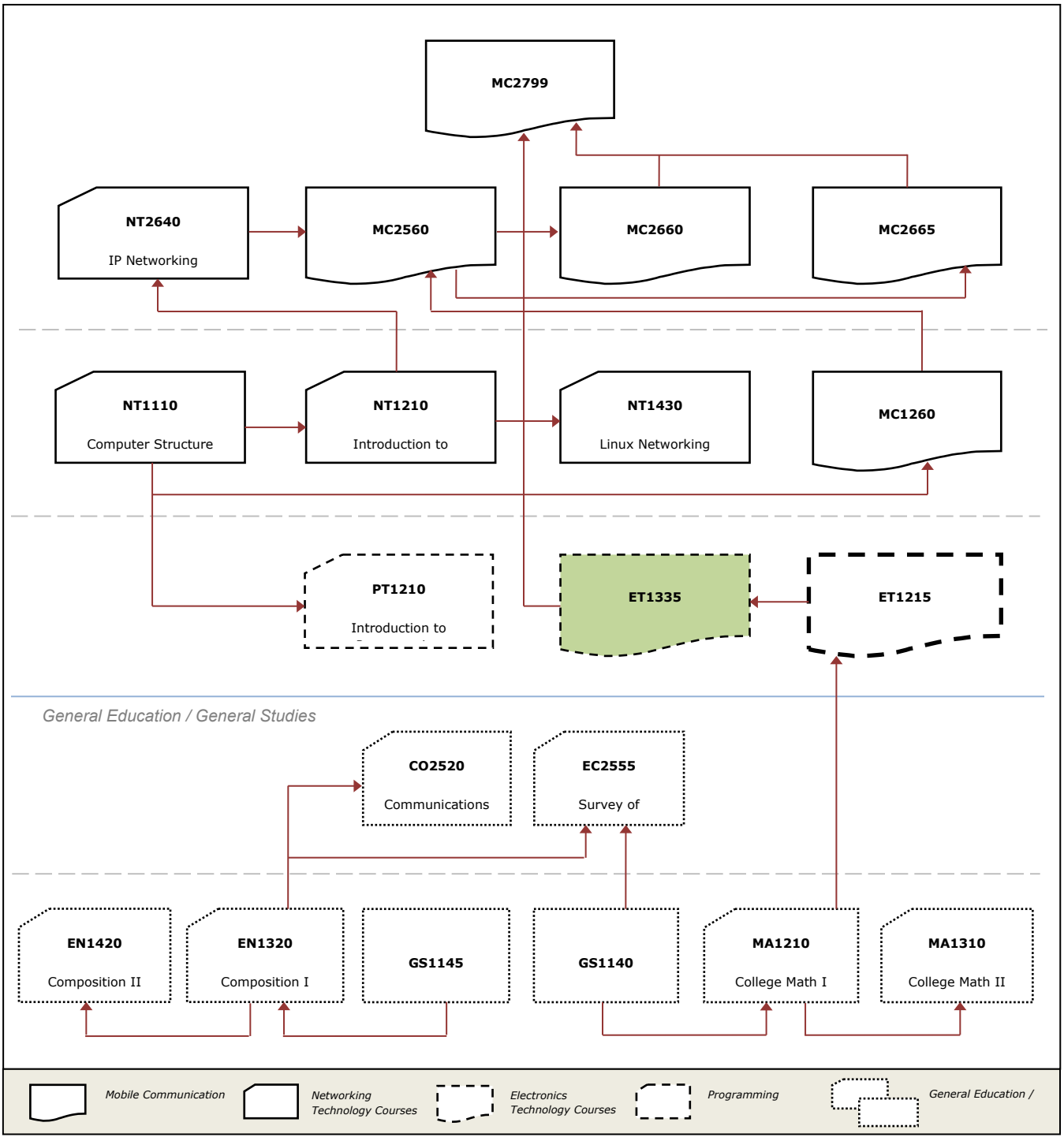
Contact hours: 56 (34 Theory Hours, 22 Lab Hours)

Where Does This Course Belong?

This course is required for the Mobile Communications Technology program. This program covers the following core areas:

- Basic electronics and electronic communications
- Networking
- Programming
- Mobile communications technology
- General education

The following diagram demonstrates how this course fits in the program:


MC2799
NT2640
IP Networking
MC2560
MC2660
MC2665
NT1110
Computer Structure
NT1210
Introduction to
NT1430
Linux Networking
MC1260
PT1210
Introduction to
ET1335
ET1215
General Education / General Studies
CO2520
Communications
EC2555
Survey of
EN1420
Composition II
EN1320
Composition I
GS1145
GS1140
MA1210
College Math I
MA1310
College Math II
Mobile Communication
Networking Technology Courses
Electronics Technology Courses
Programming
General Education /

Course Summary

Course Description

This course introduces fundamental concepts and principles in electronic communications systems. A laboratory provides practical experience using both physical components and computer-generated simulations.

Major Instructional Areas

1. Communications concepts
2. Modulations: transmission and reception
3. Coding techniques
4. Digital modulation and multiplexing
5. Communications systems
6. Transmission lines
7. Wave propagation
8. Fiber optics

Course Objectives

This course has the following instructional objectives:

1. Describing the basic concepts and principles in electronic communications systems.
2. Applying analog modulation techniques to combine analog intelligence with a carrier for transmission.
3. Applying digital modulation techniques to combine digital intelligence with a carrier for transmission.

4. Applying multiplexing techniques to transfer information from one communication system to another.
5. Evaluating the different transmission media used to transfer information between communication systems.

Learning Outcomes

Upon completion of this course, the students are expected to:

1. Identify the basic building blocks of an electronic communication system.
2. Apply the electromagnetic frequency spectrum to determine how frequency bands are used.
3. Examine the government services that regulate and manage the frequency spectrum in the U.S.
4. Analyze the electronic waveform by using amplitude and frequency modulation techniques.
5. Explain the relationship between the serial data rate and the bandwidth needed to pass the signal and data with limited error by using Hartley's law and the Shannon's theory.
6. Explain the relationship between signal noise and signal intelligence.
7. Describe quantization and line coding techniques used to transform analog signals to digital and discrete signals.
8. Use frequency shift keying (FSK), binary phase shift keying (BPSK), quadrature phase shift keying (QPSK), and multi-level quadrature amplitude modulation (M-QAM) digital modulation techniques to demonstrate how digital data is transmitted.
9. Draw block diagrams of a modern solid-state radio transmitter and receiver, identify all major components and describe how they work.
10. Compare how radio waves are propagated in a wire and through free space.
11. Analyze the characteristics of the different types of transmission lines.
12. Explain how fiber-optic data communications work.
13. Describe the components that comprise a fiber-optic data communications system.

Learning Materials and References

Required Resources

Textbook Package	New to this Course	Carried over from Previous Course(s)	Required for Subsequent Course(s)
Beasley, Jeffrey S., & Miller, Gary M. (2008). *Modern Electronic Communication*. 9th edition. Upper Saddle River, NJ: Pearson Prentice Hall.	■		
Beasley, Jeffrey S., Miller, Gary M., & Shores, David H. (2008) *Laboratory Manual to Accompany Modern Electronic Communication*. 9th edition. Upper Saddle River, NJ: Pearson Prentice Hall.	■		
Modern Electronic Communication, Student Resource CD	■		
Other Items	**New to this Course**	**Carried over from Previous Course(s)**	**Required for Subsequent Course(s)**
MultiSim		■	
MCT Program Toolkit		■	

Recommended Resources

Books, Professional Journals

- Blake, R. (2002). *Electronic Communications Systems* (2nd ed.). Delmar Thomson Learning.

- Blaker, J. W. (2000). *Optics: An Introduction for Technicians and Technologists*. Prentice Hall.
- Dungan, F. R. (1998). *Electronic Communication Systems* (3rd ed.). Delmar Publishers.
- Frenzel, L. E. (1998). *Principles of Electronic Communication Systems.* Glencoe.
- Harsany, S. C. (1997). *Principles of Microwave Technology*. Prentice Hall.
- Reis, R. (1999). *Electronic Project Design and Fabrication* (4th ed.). Prentice Hall.
- Sterling, D. J. (2000). *Technician's Guide to Fiber Optics* (3rd ed.). Delmar.
- Tomasi, W. (2001). *Electronic Communications Systems* (5th ed.), Prentice Hall.
- Whitaker, J. & Benson, B. (2003). *Standard Handbook of Audio and Radio Engineering*. McGraw-Hill.

Professional Associations

- American Radio Relay League
- Consumer Electronics Association
- Electronics Technicians Association
- IEEE
- Telecommunications Industry Association
- United Telecom Council

ITT Tech Virtual Library (accessed via Student Portal)

School of Electronics Technology> Recommended Links

- Articles and books
    - ASN.1: Communication Between Heterogeneous Systems, International Communications Union
    - The Radio Amateur's Handbook
    - The Scientist And Engineer's Guide To Digital Signal Processing

- Certification
  - ETA Certifications
- Circuits
  - Circuit Exchange International
  - Delabs Electronic Circuits
  - Discover Circuits
  - Electronics Zone
  - FC's Circuits
- Dictionaries
  - Telecomm Glossary 2000
- Networks
  - WirelessDevNet
- Online magazines and journals
  - Communications Engineering & Design Magazine
  - Computerworld
  - IEEE Spectrum Online
  - Wireless Design & Development
- Reference resources
  - Educypedia: Electricity and Electronics
  - Electronics Learning Resources on the WWW
- Standards
  - National Institute of Standards & Technology
  - TIA (Telecommunications Industry Association)

- Telecommunications
    - Analysys: Telecoms Virtual Library
    - The 3G Portal
    - Wireless Week

Books> Ebary

- Bates, R. J. (2001). *Introduction to Optical Communications*. McGraw-Hill Professional Publishing.
- Gibilisco, S. (2001). *The Illustrated Dictionary of Electronics* (8th ed.). NY: McGraw-Hill.
- Laster, C. (2001). *The Beginner's Handbook of Amateur Radio* (4th ed.). NY: McGraw-Hill.
- Pecar, J. A. & Garbin, D. A., *The New McGraw-Hill Telecom Factbook* (2nd ed.), McGraw-Hill Professional Book Group.
- Shepard, S. (2002). *Metro Area Networking*. McGraw-Hill Professional Publishing.
- Shepard, S. (2005). *Telecom Crash Course* (2nd ed.). McGraw-Hill Professional Publishing.

Books> CRCNetBase

- Gibson, J. D. (2002). *The Communications Handbook* (2nd ed.). Boca Raton, FL: CRC Press LLC.
- Goure, J-P. & Verrier, I. (2001). *Optical Fiber Devices*. London: Institute of Physics Publishing.
- Kolawole, M. O. (2002). *Satellite Communication Engineering*. NY: Marcel Dekker, Inc.
- Someda, C. G. (2006). *Electromagnetic Waves* (2nd ed.). Boca Raton, FL: CRC Press Taylor and Francis Group.
- Terplan, K. & Morreale, P. (2001). *The CRC Handbook of Modern Telecommunications*. Boca Raton, FL: CRC Press LLC.

- Terplan, K. & Morreale, P. (2000). *The Telecommunications Handbook*. Boca Raton, FL: CRC Press LLC.

Books- 24x7

- Laino, J. (2002). *The Telecom Handbook: Understanding Business Telecommunications systems & services* (4th ed.). NY: CMP Books.
- Muller, N. J. (2000). *Desktop Encyclopedia of Telecommunications* (2nd ed.). NY: McGraw-Hill.
- Muller, N. J. (1998). *Mobile Telecommunications Factbook.* NY: McGraw-Hill.

Other References

- Communications-electronics Fundamentals
  http://www.cbtricks.com/miscellaneous/tech_publications/neets/tc9_64.pdf
- EM Waves, Laungston College Physics
  http://www.launc.tased.edu.au/online/sciences/physics/E_M.html
- ETSI Standards
  http://www.etsi.org/WebSite/document/Technologies/LEAFLETS/Radio%20Frequency%20Spectrum_2010_02.pdf
- FCC Web site
  http://www.fcc.gov/
- Light, Laungston College Physics
  http://www.launc.tased.edu.au/online/sciences/physics/lightwavepart.html
- Standing Waves, Laungston College Physics
  http://www.launc.tased.edu.au/online/sciences/physics/standing.html
- Tuning a Receiver, Molecular Expressions
  http://micro.magnet.fsu.edu/electromag/java/radio/index.html

Information Search

Use the following keywords to search for additional online resources that may be used for supporting your work on the course assignments:

- Coding
- Discriminator
- Intelligence
- Modulation
- Multiplexing
- Nyquist
- Phase Locked Loop
- Preemphasis & deemphasis
- Propagation
- Quantization
- Selectivity
- Sensitivity
- Shift Keying
- Smith Chart
- Standing Wave Ratio

NOTE: All links are subject to change without prior notice.

Course Plan

Suggested Learning Approach

In this course, you will be studying individually and within a group of your peers. As you work on the course deliverables, you are encouraged to share ideas with your peers and instructor, work collaboratively on projects and team assignments, raise critical questions, and provide constructive feedback.

Use the following advice to receive maximum learning benefits from your participation in this course:

DO	DON'T
▪ Do take a proactive learning approach ▪ Do share your thoughts on critical issues and potential problem solutions ▪ Do plan your course work in advance ▪ Do explore a variety of learning resources in addition to the textbook ▪ Do offer relevant examples from your experience ▪ Do make an effort to understand different points of view ▪ Do connect concepts explored in this course to real-life professional situations and your own experiences	▪ Don't assume there is only one correct answer to a question ▪ Don't be afraid to share your perspective on the issues analyzed in the course ▪ Don't be negative about the points of view that are different from yours ▪ Don't underestimate the impact of collaboration on your learning ▪ Don't limit your course experience to reading the textbook ▪ Don't postpone your work on the course deliverables – work on small assignment components every day

Course Outline

Unit #	Unit Title	Grading Category	Activity/Deliverable Title	Grade Allocation (% of all graded work)
Unit 1 Reading Assignment: Beasley, Chapter 1, sections 1-1 – 1-4 and 1-6				
1	**Introductory Topics**	Assignment	Homework 1	2%
		Lab	Lab 1: dB Measurements & Filters	2%
Unit 2 Reading Assignment: Beasley, Chapter 2, sections 2-1 – 2-6				
2	**Amplitude Modulation – Transmission**	Quiz	Quiz 1	2%
		Assignment	Homework 2	2%
		Lab	Lab 2: AM Modulation	2%
Unit 3 Reading Assignment: Beasley, Chapter 3, sections 3-1 – 3-7 and Chapter 4, Section 4-1				
3	**Amplitude Modulation – Reception**	Quiz	Quiz 2	2%
		Assignment	Homework 3	2%
		Lab	Lab 3: AM Receivers	2%
Unit 4 Reading Assignment: Beasley, Chapter 5, sections 5-1 – 5-6, and 5-9				
4	**Frequency Modulation – Transmission**	Exam	Exam 1	5%
		Assignment	Homework 4	2%

Unit #	Unit Title	Grading Category	Activity/Deliverable Title	Grade Allocation (% of all graded work)
		Lab	Lab 4: Spectrum Analyzers and FM Modulation	2%
Unit 5 Reading Assignment: Beasley, Chapter 6, sections 6-1 – 6-4 and 6-7				
5	**Frequency Modulation - Reception**	Quiz	Quiz 3	2%
		Assignment	Homework 5	2%
		Lab	Lab 5: FM Demodulation Principles	2%
Unit 6 Reading Assignment: Beasley, Chapter 8, sections 8-1 – 8-6				
6	**Digital Coding Techniques**	Exam	Exam 2	5%
		Assignments	Homework 6	2%
		Lab	Lab 6: Pulse Amplitude Modulation	2%
Unit 7 Reading Assignment: Beasley, Chapter 9, sections 9-1 – 9-3, 9-5, and 9-6				
7	**Wired Digital Communications**	Quiz	Quiz 4	2%
		Assignment	Homework 7	2%
		Lab	Lab 7: Pulse-Width Modulation and Detection	2%
Unit 8 Reading Assignment: Beasley, Chapter 10, sections 10-1 – 10-4 and Chapter 11, sections 11-4 and 11-10				
8	**Wireless Digital and Network Communications**	Quiz	Quiz 5	2%
		Assignment	Homework 8	2%

Unit #	Unit Title	Grading Category	Activity/Deliverable Title	Grade Allocation (% of all graded work)
		Lab	Lab 8: Digital Communication using Frequency Shift Keying	2%
		Research Paper	U.S. Frequency Allocation and Management	10%
Unit 9 Reading Assignment: Beasley, Chapter 12, sections 12-1 – 12-3, 12-5, and 12-6 and Chapter 13, sections 13-1 – 13-5				
9	**Transmission Lines and Wave Propagation**	Exam	Exam 3	5%
		Assignment	Homework 9	2%
		Lab	Lab 9: Tone Decoder	2%
Unit 10 Reading Assignment: Beasley, Chapter 18, sections 18-1 – 18-8 and Chapter 16, section 16-6				
10	**Fiber Optics and Lasers**	Quiz	Quiz 6	2%
		Assignment	Homework 10	2%
		Lab	Lab 10: A Fiber Optic Link	2%
Unit 11 Reading Assignment: Beasley, Review all chapters from Units 1-10				
11	**Course Review and Final Examination**	Final Exam	Final Exam	20%
		Lab	Lab 11: A Fiber Optic System	3%

Evaluation and Grading

Evaluation Criteria

The graded assignments will be evaluated using the following weighted categories:

Category	Weight
Assignment	20%
Lab	23%
Research Paper	10%
Quiz	12%
Exams	15%
Final Exam	20%
TOTAL	**100%**

Grade Conversion

The final grades will be calculated from the percentages earned in the course, as follows:

Grade	Percentage	Credit
A	90–100%	4.0
B+	85–89%	3.5
B	80–84%	3.0
C+	75–79%	2.5
C	70–74%	2.0
D+	65–69%	1.5
D	60–64%	1.0

F	<60%	0.0

Academic Integrity

All students must comply with the policies that regulate all forms of academic dishonesty, or academic misconduct, including plagiarism, self-plagiarism, fabrication, deception, cheating, and sabotage. For more information on the academic honesty policies, refer to the Student Handbook and the Course Catalog.

(End of Syllabus)

