ITT Technical Institute

ET1215

Basic Electronics

Onsite Course

SYLLABUS

Credit hours: 4.5

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

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

Prerequisite or Corequisite: MA1210 College Mathematics I or equivalent

Course Description:

This course studies the fundamental laws and components in basic analog and digital circuits. A laboratory provides practical experience using both physical components and computer-generated simulations.

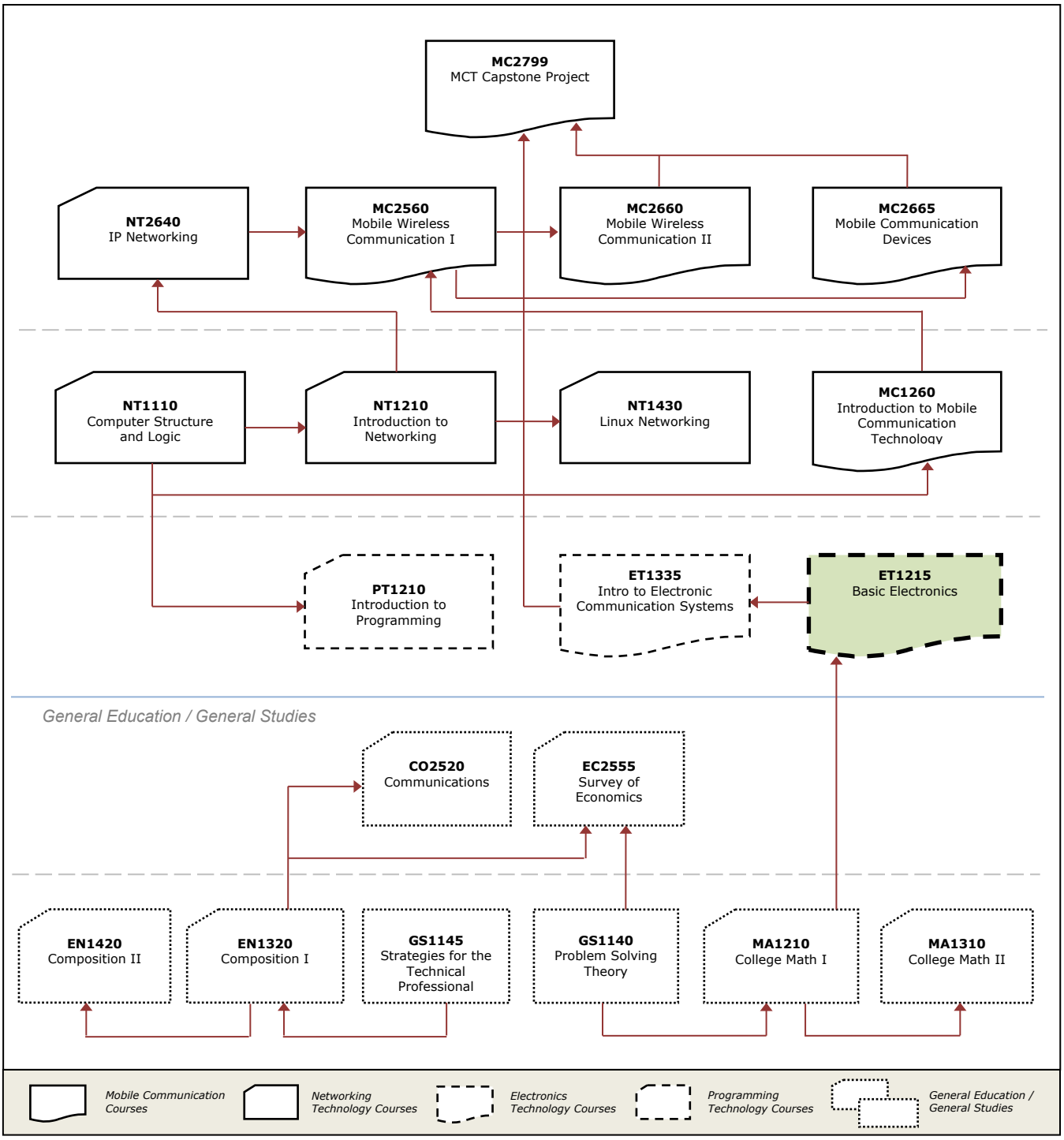
Where Does This Course Belong?

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

- Basic Electronics and Electronics Communication
- Networking
- Programming
- Mobile Communications Technology
- General Education

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

Diagram to be provided by ITT/ESI.


MC2799
MCT Capstone Project
NT2640
IP Networking
MC2560
Mobile Wireless
Communication I
MC2660
Mobile Wireless
Communication II
MC2665
Mobile Communication
Devices
NT1110
Computer Structure
and Logic
NT1210
Introduction to
Networking
NT1430
Linux Networking
MC1260
Introduction to Mobile
Communication
Technology
PT1210
Introduction to
Programming
ET1335
Intro to Electronic
Communication Systems
ET1215
Basic Electronics
General Education / General Studies
CO2520
Communications
EC2555
Survey of
Economics
EN1420
Composition II
EN1320
Composition I
GS1145
Strategies for the
Technical
Professional
GS1140
Problem Solving
Theory
MA1210
College Math I
MA1310
College Math II
Mobile Communication
Courses
Networking
Technology Courses
Electronics
Technology Courses
Programming
Technology Courses
General Education /
General Studies

Course Summary

Major Instructional Areas

1. DC circuits
2. AC circuits
3. Electronic devices (solid-state electronics and integrated circuits)
4. Digital fundamentals

Course Objectives

1. Describe basic laws, principles, and components in DC and AC circuits with practical applications.
2. Explain the fundamental characteristics, functions, and applications of major solid-state devices and circuits.
3. Describe the basic functionality and applications of integrated circuits.
4. Discuss the properties and applications of basic operational amplifiers.
5. Define the terms analog and digital and distinguish between digital and analog signals.
6. Name and identify the basic logic operations such as AND, OR, NAND, NOR, XOR and inverter, show the logic symbol, write the Boolean expression, write the truth table and draw input and output signal diagrams.
7. Translate between truth table and Boolean expression. Write the Boolean expression from a logic diagram and draw the logic diagram from a Boolean expression.
8. Name the three basic types of flip flops such as RS/latch, D type and JK, draw their logic symbol, and explain the operation of each with truth tables and logic signals. Name an application for each.
9. Explain the operation of a storage register and a shift register.
10. Explain the operation of a binary up counter, down counter, BCD counter and frequency divider.

SCANS Objectives

S.C.A.N.S is an acronym for Secretary's Commission on Achieving Necessary Skills. The committee, appointed by the National Secretary of Labor in 1990, created a list of skills and competencies that continue to be a valuable resource for individuals developing their careers in a high-tech job market. For more information on the SCANS objectives, visit the U.S. Department of Labor Employment and Training Administration: www.doleta.gov.

Learning Materials and References

Required Resources

Textbook Package	New to this Course	Carried over from Previous Course(s)	Required for Subsequent Course(s)
Cook, N. P. (2004). *Electronics: A complete course* (2nd	■		

Textbook Package	New to this Course	Carried over from Previous Course(s)	Required for Subsequent Course(s)
ed.). Upper Saddle River, NJ: Prentice Hall.			
CD: Electronics Workbench to Accompany Cook, N. P. (2004). *Electronics: A complete course* (2nd ed.). Upper Saddle River, NJ: Prentice Hall.	■		
Lab Manual to Accompany Cook, N. P., & Lancaster, G. A. (2004). *Electronics: A complete course* (2nd ed.). Upper Saddle River, NJ: Prentice Hall.	■		
Other Items	**New to this Course**	**Carried over from Previous Course(s)**	**Required for Subsequent Course(s)**
Software application: Student computers with Multisim software installed	■		■
Student ET1215 tool kit: This will be part of the Lab equipment and will remain in the lab, not to be issued to the students.	■		■

Recommended Resources

Books, Professional Journals

- Gibilisco, S. (2001*). Illustrated dictionary of electronics*. New York, NY: McGraw-Hill Professional. Dictionary with thousands of illustrations for electronics terms.

Professional Associations

- Institute of Electrical and Electronics Engineers (IEEE)
  http://www.ieee.org/index.html (accessed 1/13/2011)
  The largest professional association for technological innovation and excellence with the main goal of improving humanity
- Society of Manufacturing Engineers (SME)
  http://www.sme.org/ (accessed 1/13/2011)
  World's leading association for manufacturing engineers. Dedicated to sharing the most up-to-date knowledge about advancements in manufacturing engineering.
- International Society of Certified Electronics Technicians (ISCET)
  http://www.iscet.org/ (accessed 1/13/2011)
  ISCET aims to train, prepare, and test technicians in the fields of electronics and appliance service. They also promote voluntary certification and offer student resources.
- Electronics Technicians Association International (ETA-I)
  http://www.eta-i.org/ (accessed 1/13/2011)
  This worldwide association represents and supports those in the electronics profession. Members are from a variety of electronics-related fields including telecommunication, wireless communications, and computer networking.

- International Association for Radio, Telecommunications and Electromagnetics (iNarte) http://www.narte.org/ (accessed 1/13/11)
  Official Web site of iNarte a worldwide, non-profit, professional telecommunications association which certifies qualified engineers and technicians in the fields of Telecommunications, Electromagnetic Compatibility/Interference (EMC/EMI), Product Safety (PS), Electrostatic Discharge control (ESD) and Wireless Systems Installation

ITT Tech Virtual Library (accessed via Student Portal)

Books

- Amdahl, K. (1991). *There are no electrons: Electronics for earthlings*. Broomfield, CO: Clearwater Publishing Company.
  Uses humorous explanations and stories to teach basic electronics concepts.
- Cathey, J. J. (2002). *Schaum's outline of electronic devices and circuits* (2nd ed.). New York, NY: McGraw-Hill.
  Study guide and student problems for basic electronics.
- Gregg, J. (1998). *Ones and zeros: Understanding Boolean algebra, digital circuits, and the logic of sets*. New York, NY: IEEE Press.
  Provides a detailed history, in lay terms, of the mathematics behind digital computer circuitry.
- Horowitz, P., & Hill, W. (1999). *The art of electronics*. New York, NY: Cambridge University Press.
  Offers a largely nonmathematical approach to digital and analog circuit design.
- Su, K. L. (2002). *Analog Filters* (2nd ed.). Secaucus, NJ: Kluwer Academic Publishers.
  Explains the fundamentals and theory behind the four major types of analogs.
- Tocci, R. J., & Widmer, N. S. (2001) *Digital systems, principles and applications*. Upper Saddle River, NJ: Prentice-Hall.
  Covers the basics of digital electronics and builds to advanced study of digital systems and hardware.

Other References

- http://electronics.howstuffworks.com/diode.htm (accessed 1/13/11)
  Basic tutorial on how semiconductors work
- http://science-ebooks.com/electronics/basic_electronics.htm (accessed 1/13/11)
  Complete basic electronics course with simulations; some chapters with MP3 audio lectures
- http://www.allaboutcircuits.com/vol_3/index.html (accessed 1/13/11)
  In-depth online textbook about semiconductors
- http://www.americanmicrosemi.com/tutorials/diode.htm (accessed 1/13/11)
  Detailed tutorials on semiconductors
- http://www.prenhall.com/floyd/ (accessed 1/13/11)

Online resources for a variety of electronics textbooks by renowned Thomas L. Floyd.

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

Information Search

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

- Ohm's Law
- Kirchhoff's Law
- Alternating current
- Direct current
- Series circuits
- Parallel circuits

Course Plan

Instructional Methods

This course is designed to promote learner-centered activities and support the development of cognitive strategies and competencies necessary for effective task performance and critical problem solving. The course utilizes individual and group learning activities, performance-driven assignments, problem-based cases, projects, and discussions. These methods focus on building engaging learning experiences conducive to development of critical knowledge and skills that can be effectively applied in professional contexts.

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	Reading Assignments	Graded Activities & Deliverables

Unit	Reading Assignments	Graded Activities & Deliverables
Unit 1: DC/AC Electronics (Week 1)	Cook ▪ Chapter 1 ▪ Chapter 2 ▪ Chapter 3, pp. 84-104 ▪ Chapter 4, pp. 116-130	▪ Homework assignment 1: selected review questions pp. 32,78,79,112,113 ▪ Lab 1 Set (Experiments #1, 2, 3, 4, 5, 7))
Unit 1: DC/AC Electronics (Week 2)	Cook ▪ Chapter 6	▪ Homework assignment 2: selected review questions pp. 208,209 ▪ Quiz 1 ▪ Lab 2 Set (Experiments #24, 6, 33)
Unit 1: DC/AC Electronics (Week 3)	Cook ▪ Chapter 7, pp. 212-229 ▪ Chapter 8, pp. 274-313	▪ Homework assignment 3: selected review questions pp. 313,314 ▪ Quiz 2 ▪ Lab 3 Set (Experiments #25 and 28)
Unit 2: Solid-State Electronics (Week 4)	Cook ▪ Chapter 11, pp. 372-376 and pp. 384-414 ▪ Chapter 12, pp. 424-434 ▪ Chapter 13	▪ Homework assignment 4: Selected review questions pp. 414, 415 ▪ Unit Exam 1 ▪ Lab 4 Set (Experiments #47 and 48)
Unit 2: Solid-State Electronics (Week 5)	Cook ▪ Chapter 12 ▪ Chapter 13	▪ Homework assignment 5: selected review questions pp. 472,473 ▪ Quiz 3 ▪ Lab 5 Set (Experiment #51)
Unit 3: Integrated Circuits (Week 6)	Cook ▪ Chapter 15, pp. 542-564	▪ Homework assignment 6: selected review questions pp. 586 ▪ Quiz 4 ▪ Lab 6 Set (Experiments #55 and 56)
Unit 3: Integrated Circuits (Week 7)	Cook ▪ Chapter 15, pp. 565-586	▪ Homework assignment 7: selected review questions pp. 586 ▪ Quiz 5 ▪ Lab 7 Set (Experiment #73)
Unit 4: Digital Fundamentals (Week 8)	Cook ▪ Chapter 18	▪ Homework assignment 8: selected review questions p. 647 ▪ Unit Exam 2 ▪ Lab 8 Set (Experiment #57)
Unit 4: Digital Fundamentals (Week 9)	Cook/Lancaster ▪ Chapter 19, pp. 654-662	▪ Homework assignment 9: selected review questions p. 682 ▪ Quiz 6 ▪ Lab 9 Set (Experiments #60 and 61)
Unit 4: Digital Fundamentals (Week 10)	Cook/Lancaster ▪ Chapter 24	▪ Homework assignment 10: selected review questions p. 825 ▪ Lab 10 Set (Experiment #66)
Unit 5: Course Review and Final Exam (Week 11)	Cook ▪ All chapters and page	▪ Review and Final Exam

Unit	Reading Assignments	Graded Activities & Deliverables
	numbers listed above	

Evaluation and Grading

Evaluation Criteria

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

Category	Weight
Assignments	15%
Quizzes	10%
Labs	25%
Unit Exams	20%
Final Exam	30%
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

Graded Activities and Deliverables

Unit #	Unit Title	Grading Category	Activity/Deliverable Title	Grade Allocation (% of all graded work)
1	DC/AC Electronics	Assignments	Homework 1	1.5%
			Homework 2	1.5%
			Homework 3	1.5%
		Labs	Lab Set 1	2.5%
			Lab Set 2	2.5%
			Lab Set 3	2.5%
		Quizzes	Quiz 1	1.67%
			Quiz 2	1.67%
2	Solid-State	Assignments	Homework 4	1.5%

	Electronics		Homework 5	1.5%
		Labs	Lab Set 4	2.5%
			Lab Set 5	2.5%
		Quizzes	Quiz 3	1.67%
		Unit Exams	Unit Exam 1	10%
3	Integrated Circuits	Assignments	Homework 6	1.5%
			Homework 7	1.5%
		Labs	Lab Set 6	2.5%
			Lab Set 7	2.5%
		Quizzes	Quiz 4	1.67%
			Quiz 5	1.66%
4	Digital Fundamentals	Assignments	Homework 8	1.5%
			Homework 9	1.5%
			Homework 10	1.5%
		Labs	Lab 8	2.5%
			Lab 9	2.5%
			Lab 10	2.5%
		Quizzes	Quiz 6	1.66%
		Unit Exams	Unit Exam 2	10%
5	Course Review and Final Exam	Final Exam	Final Exam	30%

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)