ITT Technical Institute

MC2760

Mobile and Cellular Networks

Onsite Course

SYLLABUS

Credit hours: 1.5

Contact/Instructional hours: 15 (15 Theory Hours)

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

Prerequisite: MC2660 Mobile Wireless Communications II or equivalent

Course Description:

This course involves the study of network technologies, architectures, generations and standards; basic 2G, 2G+, 3G, 3G+ mobile/cellular network architecture and functions; voice and data service connection, routing and management; radio access network; core switching network.

Where Does This Course Belong?

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

- Basic electronics
- Electronic communications systems
- Computers
- Networking
- Programming
- Mobile wireless communications
- Mobile communications devices

Course Summary

Major Instructional Areas

1. Cellular network technologies
2. Cellular network architectures and functions
3. Generations and standards
4. Voice and data service connection
5. Routing and management
6. Radio access network
7. Core switching network

Course Objectives

1. Analyze the fundamentals of a cellular network.
2. Describe cellular network architectures and functions.
3. Explain the generations and standards of cellular networks.
4. Analyze voice and data service connection.
5. Describe routing and management.
6. Explain radio access and core switching networks.
7. Explain the backhaul networks evolution.
8. Explain the necessity for mobile network policies.
9. Explain content and service delivery.

Learning Materials and References

Required Resources

Textbook Package	New to this Course	Carried over from Previous Course(s)	Required for Subsequent Course(s)
Grayson, M. (2009). *IP design for mobile networks*. Indianapolis, IN: Cisco Press.	■		

Recommended Resources

Professional Associations (all links checked 10/07/11)

- American National Standards Institute (ANSI): www.ansi.org
- CDMA Development Group (CDG): www.cdg.org
- Cellular Telecommunications Internet Association (CTIA): http://www.ctia.org/
- Computer and Communications Industry Association (CCIA): Defense Advanced Research Projects Agency (DARPA): www.darpa.mil
- European Telecommunications Standards Institute (ETSI): www.etsi.org
- Federal Communications Commission (FCC): www.fcc.gov
- Institute of Electrical and Electronics Engineers, Inc. (IEEE): www.ieee.org
- Internet Assigned Numbers Authority (IANA): www.iana.org
- Internet Society (ISOC) : www.isoc.org/isoc/
- Mobile Satellite Users Associations (MSUA): www.msua.org
- National Institute of Standards and Technology (NIST): www.nist.gov
- National Technical Information Service (NTIS): www.ntis.gov
- National Telecommunications and Information Administration (NTIA): www.ntia.doc.gov
- Open Mobile Alliance (OMA) & WAP Forum: www.openmobilealliance.org
- Personal Communications Industry Association (PCIA): www.pcia.com
- Portable Computer and Communications Association (PCCA): www.pcca.org
- Satellite Broadcasting & Communications Association (SBCA): www.sbca.com
- Satellite Industry Association (SIA): www.sia.org
- Telecommunications Industry Association (TIA): www.tiaonline.org
- The Computing Technology Industry Association (CompTIA): www.comptia.org
- The Consumer Electronics Association (CEA) : www.ce.org
- United States Internet Service Provider Association (USIPSA): www.cix.org
- United States Telecom Association: www.usta.org
- United States Telecommunications Training Institute (USTTI): www.ustti.org

- Wi-Fi Alliance: http://www.wi-fi.org/index.php
- Wireless Communications Association International (WCA): www.wcai.com

Information Search

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

- Access methods (wireless)
- ALOHA scheme
- AMPS (Advanced Mobile Phone Services)
- Antenna technology
- Authentication
- CDMA
- Cellular systems
- Frequency-division multiple access
- GSM
- HARQ
- Location-based services
- MIMO
- Mobile Internet Protocol
- UMTS
- WiMAX/Mobile
- Wireless systems

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 1: RADIO SYSTEMS

Out-of-class work:
3 hours

Upon completion of this unit, students are expected to:

- Describe radio frequency wave propagation.

- Identify various multiple access technologies as applied to cellular communications.

READING ASSIGNMENT	GRADED ACTIVITIES / DELIVERABLES		
	Grading Category	**Activity/Deliverable Title**	**Grade Allocation** (% of all graded work)
Grayson, Chapter 1	Assignment	Unit 1 Assignment 1: Multiple Access Technologies Research Assignment	2.78%

Unit 2: CELLULAR ACCESS SYSTEMS

Out-of-class work: *3 hours*

Upon completion of this unit, students are expected to:

- Describe GSM Access Systems.
- Describe the UMTS Terrestrial Access Network.
- Discuss the properties of the CDMA 2000 System.

READING ASSIGNMENT	GRADED ACTIVITIES / DELIVERABLES		
	Grading Category	**Activity/Deliverable Title**	**Grade Allocation** (% of all graded work)
Grayson, Chapter 2	Assignment	Unit 2 Assignment 1: 3GPP2	2.78%

Unit 3: ALL-IP ACCESS SYSTEMS

Out-of-class work: *3 hours*

Upon completion of this unit, students are expected to:

- Describe the features and history of Wireless Local Area Networks.
- Describe wireless data systems the cellular systems utilize.

READING ASSIGNMENT	GRADED ACTIVITIES / DELIVERABLES		
	Grading Category	**Activity/Deliverable Title**	**Grade Allocation** (% of all graded work)
Grayson, Chapter 3	Assignment	Unit 3 Assignment 1: Public WAN	2.78%

Unit 4: IP REFRESHER

Out-of-class work: *4 hours*

Upon completion of this unit, students are expected to:

- Discuss IP networking and routing.
- Design a typical network layout.

READING ASSIGNMENT	GRADED ACTIVITIES / DELIVERABLES		
	Grading Category	**Activity/Deliverable Title**	**Grade Allocation** (% of all graded work)

Grayson, Chapter 4	Assignment	Unit 4 Assignment 1: IPv6 Text Representation	2.78%

Unit 5: CONNECTIVITY AND TRANSPORT

Out-of-class work: *3 hours*

Upon completion of this unit, students are expected to:

- Compare wired network connectivity to radio based network connectivity.

READING ASSIGNMENT	GRADED ACTIVITIES / DELIVERABLES		
	Grading Category	**Activity/Deliverable Title**	**Grade Allocation** (% of all graded work)
Grayson, Chapter 5	Assignment	Unit 5 Assignment 1: GPS and MSC	2.78%

Unit 6: MOBILE ACCESS NETWORKS

Out-of-class work: *3 hours*

Upon completion of this unit, students are expected to:

- Describe circuit switched and packet switched cellular networks.

READING ASSIGNMENT	GRADED ACTIVITIES / DELIVERABLES		
	Grading Category	**Activity/Deliverable Title**	**Grade Allocation** (% of all graded work)
Grayson, Chapter 6	Assignment	Unit 6 Assignment 1: Circuit and Packet Switching	2.78%
	Project	Research Project Part 1	25%

Unit 7: OFFLOADING TRADITIONAL NETWORKS WITH IP

Out-of-class work: *3 hours*

Upon completion of this unit, students are expected to:

- Explain the need for enforcing policies on wireless networks.

READING ASSIGNMENT	GRADED ACTIVITIES / DELIVERABLES		
	Grading Category	**Activity/Deliverable Title**	**Grade Allocation** (% of all graded work)
Grayson, Chapter 7	Assignment	Unit 7 Assignment 1: TDM	2.78%

Unit 8: MOBILE NETWORK POLICIES

Out-of-class work: *3 hours*

Upon completion of this unit, students are expected to:

- Explain the need for enforcing policies on wireless networks.

READING ASSIGNMENT	GRADED ACTIVITIES / DELIVERABLES		
	Grading Category	**Activity/Deliverable Title**	**Grade Allocation** (% of all graded work)

Grayson, Chapter 8	Assignment	Unit 8 Assignment 1: Proactive and Reactive Policies	2.78%

Unit 9: SERVICE DELIVERY PLATFORM

Out-of-class work: *3 hours*

Upon completion of this unit, students are expected to:

- Describe service delivery platforms.

READING ASSIGNMENT	GRADED ACTIVITIES / DELIVERABLES		
	Grading Category	**Activity/Deliverable Title**	**Grade Allocation** (% of all graded work)
Grayson, Chapter 9	Assignment	Unit 9 Assignment 1: Local/Mobile Portability	2.78%

Unit 10: PROJECT PRESENTATION

Out-of-class work: *3 hours*

Upon completion of this unit, students are expected to:

- Present the wireless communications project.

READING ASSIGNMENT	GRADED ACTIVITIES / DELIVERABLES		
	Grading Category	**Activity/Deliverable Title**	**Grade Allocation** (% of all graded work)
None	Project	Research Project Part 2 and Presentation	25%

Unit 11: COURSE REVIEW AND FINAL EXAM

Out-of-class work: *3 hrs.*

Upon completion of this unit, students are expected to:

- Demonstrate knowledge of wireless systems.
- Demonstrate application of knowledge of wireless system.

READING ASSIGNMENT	GRADED ACTIVITIES / DELIVERABLES		
	Grading Category	**Activity/Deliverable Title**	**Grade Allocation** (% of all graded work)
None	Exam	Final Exam	25%

Evaluation and Grading

Evaluation Criteria

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

Category	Weight
Assignments	25%
Project	50%
Exam	25%
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.