

**Communication Technology and Innovation - Com. 4490**

**Richard A. Gershon, Ph.D.**

**Western Michigan University**

**School of Communication**

**Kalamazoo, MI 49008**

**Email:** [**Richard.Gershon@wmich.edu**](mailto:Richard.Gershon@wmich.edu)

**Web Site:** [**http://www.rgershon.com**](http://www.rgershon.com)

**COURSE DESCRIPTION**

From smart phones to smart cities, this course will examine a number of media and information technologies that have transformed the business of communication. It is intended for the working professional who requires an applied understanding of the design characteristics and performance features of several important communication technologies including cable television and smart homes, digital media and electronic commerce, satellite communications, smart phones and wireless communication, intelligent networking and virtual reality.

Part of our assignment involves taking a closer look at a number of issues pertaining to   
the social use of media and information technology. Special attention is given to such topical issues as digital lifestyle and personalization, social networking (Facebook, Twitter etc.), human/computer interface design as well as select theories of communication technology, including *Innovation and Design theory*, *Diffusion of Innovation*, *Innovator’s Dilemma*, *Social Presence* and *Media Richness theory*.

A second goal of this course is to look at the subject of innovation. Today, innovation is

about much more than developing new products and services. It is about reinventing business

and organizational processes and building entirely new markets to meet untapped customer

needs. Innovation is about taking organizations built for efficiency and rewiring them for

creativity and growth.

**COURSE OUTLINE**

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Class Meetings:

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Session 1. **Innovation and Technology Management**

Innovation Defined

Sustaining v. Disruptive Technologies

Innovation and Lasting Advantage

Three Kinds of Innovation

* Product Innovation
* Process Innovation
* Business Model Innovation

Blue Ocean Strategy (W. C. Kim and R. Mauborgne)

Principle of Value Innovation

Session 2. **The Electromagnetic Spectrum**

Radio Waves

Frequency and Wavelength

AM & FM Broadcasting

Attenuation Factors

Spectrum Planning and Applications

* Radio Frequency Identification (RFID)
* WIFI

The Demand for Wireless Capability

* smartphones, computer tablets, laptop computers

Session 3. **Digital Media and Innovation**

What is Digital Media?

Principles of Analog and Digital Communication

Analog to Digital Conversion

* Principles of Sampling
* Pulse Code Modulation
* Digital Video Compression

Advantages of Digital Communication

Digital Media Applications:

* Digital Photography
* Animation and Film
* Digital Television, HDTV
* Social Media
* Videogame Systems
* Digital Passes and E-Commerce

Session 4. **Information And Signaling Theory**

Signal and Transmission Theory

Shannon & Weaver Model

* Information Source
* Message
* Transmitter
* Signal / Channel
* Receiver
* Destination

Principles of Noise, Entropy and Redundancy

Multiplexing

Sharing Channel Capacity

Multiplexing: 4 Types

* Frequency Division
* Time Division
* Wave Division
* Statistical

Fiber Optic Communication

Fiber Optics: Design Features

* Single v. Multimode Fiber

Optical Fiber Advantages

* Broad Bandwidth Capability
* Immunity from Electromagnetic Interference
* Speed and Reliability

Planning Considerations: Distance and Bandwidth

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End of Part I.

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**Exam I.**

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Session 5. **Product Innovation and Design**

Ideation

* Idea Development and Synthesis

New Product Development

Product Design

The Design Philosophy of Dieter Rams

* Sony Corporation
  + Akio Morita, the Sony Walkman
  + Norio Ohga, the Compact Disk
* Apple
  + Steve Jobs
  + the MacIntosh Computer, Apple iPod
* Pixar
  + John Lasseter
  + Film Animation and Render Man – concepts
* Tesla
  + Elon Musk
  + SpaceX

Session 6. **Smartphones, Tablets and Wireless** **Data**

Cellular Telephone Networks

System Design Features

* Cell Site
* Cellular Tower
* Mobile Telephone Switching Office
* Cellular Mobile Telephone

Cellular Telephone Multiple Access Systems

* CDMA, GSM

Smart Phones

* Apple iPhone, Samsung Galaxy, Google Pixel phone

Computer Tablets

Session 7. **Business Process Innovation**

Creating Entirely New Systems of Operation

* How Work Gets Done Within the Organization

Theoretical Traditions

* Total Quality Management
* Six Sigma
* Reengineering

Netflix

* Reed Hastings
* OTT Videostreaming software

Walt Disney Company

* Walt Disney
* Customer Service is a Business Process
* Guest Flow and Transportation

Session 8. **Satellite Communication**

Satellite Communication Networks and Design

Uplinks / Downlinks

Satellite Footprints

Transponders

Geosynchronous v. LEO Orbits

Satellite/Cable Networking

Point-to-Multipoint Applications:

* Broadcast and Cable Satellites
* Direct Broadcast Satellites
* Mobile Satellite Communication
* Weather and Environment
* Voice and Data (VSATs)
* Global Positioning Systems (GPS)

Satellite Design Features

Antenna Subsystems

Transponder Subsystems

Power Supply

Satellite Deployment

Telemetry, Tracking and Command

Satellite Design

Spin v. Body Stabilized

Earth Station Design and Performance

Session 9. **Business Model Innovation**

Creating a New Business Model

Blue Ocean Strategy (T), Kim & Mauborgne

Value Innovation: Value Proposition to the Consumer

Transformative effect on the marketplace

The Long Tail (T), C. Anderson

Electronic Commerce

* Amazon.com
  + Exchange Efficiency
* Google
  + Key-word Search Advertising

Boundary Spanning (T), R. Gershon

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End of Part II.

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**Exam II.**

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Session 10. **Why Companies Fail to Innovate**

The Innovator’s Dilemma (C. Christensen)

The Innovator’s Dilemma and Product Life Cycle

Organizational Issues

* The Tyranny of Success
* Organizational Culture
* Organizations Lose their Agility and Sense of Urgency
* Lengthy Development Times – Poor Coordination
* Failures in Execution Strategy
* Organizations Become Risk Averse

Session 11. **The Intelligent Network**

TheIntelligent Network Defined

The ITS Model: Internal System Structures

* Hierarchical Ordering
  + Class 5. Telephone Switching
* Interdependency
  + Financial Credit (Credit cards)
* Exchange
  + Electronic Commerce (Amazon)
* Equifinality
  + Packet Switching (VOIP)
* Redundancy
  + Signaling Theory, Security and Compliance
* Adaptation
  + Artificial Intelligence

Internal System Processes

* Network Holism
  + The Internet
* Permeability (and Permeability Predicament)
  + Privacy Invasion, Internet Fraud

The ITS Model: System Outcomes

* Decentralization
  + The Transnational Corporation
* Virtual Communication
  + Videoconferencing, Global Virtual Teams
* Interactivity
  + Computer Interface Design, Cloud Computing
* Mobility
  + Laptop Computers, Smartphones and Tablets
* Personalization
  + Proprietary Recommendation Software (Spotify)
* Immediacy
  + Internet News Sites
* Convergence
  + Videogame Systems

Session 12. **DIFFUSION OF INNOVATION**

Initiating Change

Understanding User Resistance

*Diffusion of Innovation,* Everett Rogers

* Intended v. Unintended Consequences

Tipping Point, Malcolm Gladwell

Digital Lifestyle

High Tech – High Touch

Session 13. **Data Modeling, Simulation and Artificial Intelligence**

Data Modeling and Simulation

* CAD/CAM Programs

Geographic Information Systems

* Google Maps

Virtual Reality

* Flight and Combat Simulation
* Medical Surgery Simulation

Artificial Intelligence

* Intelligent Agents, Virtual Assistants

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End of Part III.

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**Exam III.**

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**Evaluation:**

There are three exams and one major project assignment that are each worth 25%

of your final grade.

Richard A. Gershon

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**Grading Scale:**

93-100A 70-75 C

87- 92 B/A 65-69 D/C

82- 86 B 60-64 D

76- 81 C/B -59 E

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