



Telecommunications Management

Summer 2017

Course Information*	<p>Course Number: 95705 Section: Z Course Title: Telecommunications Management Units: 12.0 Instructor: Dr. Sakir Yucel Email syucel@andrew.cmu.edu This is a distant session. Office Hours: TBA and by appointment</p> <p>Teaching Assistant: Ricardo Laverde Office Hours: TBA</p>
Prerequisites (if applicable)	<p>Typically, prerequisite for graduate students who want to take the course is an introductory course on Information Systems. Undergraduates are required to additionally have a 3.25 GPA (on a scale of 4).</p>
Description*	<p>The purpose of this course is to provide an understanding of the key technical, managerial and policy issues in the effective development and use of telecommunication solutions by organizations. Discussion of technology and technology trends will be set in the context of applications. Topics covered will include basic concepts of telecommunication technology (data and voice), Internet and intranet technologies, issues related to the operational and strategic use of the technology, economics and policy aspects of telecommunication, and the changing structure of the telecommunications industry. A number of case studies will be included in the curriculum providing students the opportunity to apply the concepts to real world situations.</p>
Course Overview	<p>We live in a very dynamic and interconnected world, which is largely driven by advances in telecommunication technology. This course is aimed at equipping students with technical and business related tools to comprehend changes in telecommunication technology and its effect on markets, consumers and society. In accordance with this goal, the course covers the managerial and technical issues surrounding telecommunication and information technologies. We will cover the fundamentals of data transmission and networking, Internet, various networking technologies, interworking and peering, which are all crucial to understand the telecommunications from a technical perspective. We will review the history of telecommunication policy and look into today's challenging policy issues such as network neutrality. We will cover various relevant topics including CDNs, p2p, cloud computing, virtualization, Internet of Things, wireless, broadband. We will study the fundamental microeconomic concepts at high level and discuss how the economic concepts are applicable to the telecommunications industry and this framework will be used to analyze real world examples in the form of case studies. The case studies will focus on the recent developments in telecommunication technologies and the disruptive impact they are having on industries as diverse as music, video, television, shopping and social networks. All discussions will be set in the context of products, services and applications that are widely used in today's industry. We will look at the different players in this complex ecosystem and how they compete and cooperate to attract consumers and dominate the marketplace.</p>
Course Materials (if applicable)	<p>Lecture Videos Lecture videos will be available for streaming and download in the Canvas page.</p>

	<p>Textbooks</p> <p>Recommended textbook is Business Data Communications by William Stallings and Thomas Case, 7th ed. This book provides a broad overview of many of the technologies discussed in the lectures. However, note that no single textbook covers the course material in the detail and depth required for this class. Check the textbook website http://williamstallings.com/BusinessDataComm/ regularly during the semester. The site provides access to telecom resources related to each chapter in the text.</p> <p>Following books are good references:</p> <ul style="list-style-type: none"> • For a coverage of the broadband telecom field from technological, business and policy angles, “Broadband Telecommunications Technologies and Management”, 1st Edition by Riaz Esmailzadeh is recommended. • For an in-depth coverage of data networks, Kurose & Ross "Computer Networking" 7th ed (2017) is an excellent reference. • For microeconomics, the following book is an excellent reference: Microeconomics: Hal R. Varian, Intermediate Microeconomics: A Modern Approach (Ninth Edition or later), W. W. Norton & Company. Note that microeconomics concepts will be covered at high level without getting into mathematical modeling. This book is a good reference for those who want to dwell into microeconomics topics. <p>Case Studies</p> <p>There are several case studies to be covered in the course. These case studies will be available for your purchase as a course pack at the Harvard Business Publishing page at the discounted student rate. You need to register and login on the site to access the case studies.</p> <p>The following is the list of case studies for this semester:</p> <ul style="list-style-type: none"> • Amazon, Apple, Facebook, Google. John Deighton; Leora Kornfeld. 513060-PDF-ENG • Akamai Technologies, Benjamin Edelman; Thomas R. Eisenmann; Eric J. Van Den Steen, 804158-PDF-ENG • Peer-to-Peer File Sharing and the Market for Digital Information Goods, Ramon Casadesus-Masanell; Andres Hervas; Jordan Mitchell, 706479-PDF-ENG • Hulu: An Evil Plot to Destroy the World? Anita Elberse; Sunil Gupta, 510005-PDF-ENG • Transforming Verizon: A Platform for Change, Rosabeth Moss Kanter; Matthew Bird, 312082-PDF-ENG • Cisco's Vision: A Smart+Connected World, Chris Laszlo; Patrick Kelly, W13547-PDF-ENG • Smartphone Industry in 2013: Samsung's Dilemma. W. Glenn Rowe; Mehdi Hossein Nejad. W14224-PDF-ENG. • Google Car. Karim R. Lakhani; James Weber; Christine Snively. 614022-PDF-ENG
<p>Evaluation* Method</p>	<p>Grading Policies</p> <p>Your grade is based on performance in assignments, case work, a term paper, a final exam and your contribution to discussion forums. These components are weighted as follows:</p> <p>Final Exam: 25%</p> <p>Term paper: 30%</p> <p>Assignments: 25%</p> <p>Case Work: 15%</p> <p>Discussion Forums Contribution: 5%</p> <p>The breakdown for the term paper grade:</p> <p>Proposal: 5%</p> <p>Progress report: 10%</p> <p>Final Report: 15%</p>

The breakdown for the assignments: each assignment is equal weight unless specified otherwise.

The breakdown for the case work:

10% for group performance

5% for individual performance

Final letter grades will be assigned as follows:

A range (A-, A, A+) - Your total weighted average: $\geq 90\%$

B range (B-, B, B+) - Your total weighted average: $81\% - <90\%$

C range (C-, C, C+) - Your total weighted average: $72\% - <81\%$

D (Failing) - Your total weighted average: $<72\%$

The distribution within a given letter grade range will be curved i.e. based on relative class performance

Exams

There will be an open-notes final exam. It will be limited in duration (e.g. 4 hours).

Term Paper

Students are required to deliver a term paper in the following phases:

- The proposal which describes the focus and objectives, the methodology of research, the value proposition of the research and the initial list of references.
- The progress report which provides updates on progress in relation to the proposal.
- The final report.

See "General Information About Term Paper and Assignments" link under "Assignments" menu for more information about the term paper.

Assignments

The assignments are designed to give students the opportunity to research relevant material in lecture notes and online resources to produce high quality answers. There will be 4 assignments. An optional assignment may be offered providing opportunity to override a low score in a regular assignment. Assignments will be posted one week in advance. These assignments are to be done individually. You are free to consult any external resources for reference, but need to provide proper citation for anything you use apart from the lecture notes. See "General Information About Term Paper and Assignments" link under "Assignments" menu for more information.

Grading criteria for each homework assignment will be provided together with the assignment.

Case Work

Case studies are meant to elicit critical thinking on your part and apply the concepts we learn in class to real world situations. Teams will be formed to prepare a presentation about a case. The group will be given the opportunity to present the case to the rest of the class over a virtual meeting platform. Attendance to the case presentations is not required but highly recommended. Grades on the case work will be dependent upon the state of preparedness, slides, setting up the context of the case, coverage of technical material (if any), coverage of relevant economic/business concepts, summarization of important takeaways from the case. Individual grades may vary within a team due to peer assessment of the performance. Details will be available later during the semester.

Discussion Board

Discussion forums provide a great opportunity to have virtual asynchronous conversations related to the lecture content.

There is one forum specifically created for the discussion of the course material, homework assignments and lectures. That forum is "Forum to Discuss Course Material". You may post your questions about the course there. The TAs and I will be looking at the posted messages regularly and provide feedback. Students are encouraged to provide answers to the questions on this discussion board.

	<p>This board allows posting anonymous messages. Personal questions, on the other hand, should be directly addressed to the instructor and/or to the TA, rather than being posted on the discussion boards.</p> <p>The forum named "Forum to Discuss Telecom Topics" allows you to discuss various aspects of telecom (e.g. business, social, policy, technology). By using this forum, you will have chance to engage in topics that interest you and talk about them with your classmates. The hypermail archive provides a great opportunity to have virtual conversations. To facilitate this, I would like each of you to post more than just a URL. You need to post the URL and add your opinions and/or analysis of the article. Also, you are expected to reply to the postings of other students expressing your viewpoint. You will earn 0.5% for each posting up to 5% total. In order to get the full 5% credit, you have to have at least three replies to other postings. Only postings time stamped before the due date will contribute toward your discussion forums grade. Note that postings into the "Forum to Discuss Course Material" will not receive any credit.</p> <p>The forum named "Forum to Discuss Term Paper Topics" allows you to share your research on your term paper topic with classmates and receive feedback from each other. Similar to the "Forum to Discuss Telecom Topics" forum, this forum earns you credit toward your discussion forums contribution.</p> <p>Since this is a distant section, we may not have opportunity to meet each other physically but we can still get to know one another. For this purpose, I created a forum where I would ask each of you to post a hello message to your classmates introducing yourself. It is named "Introducing Yourself". Participating into this forum is optional and will not get you any credit toward your discussion forums contribution just like the "Forum to Discuss Course Material".</p> <p>None of the forums is moderated at this time. I expect you to observe polite conduct in your postings and to act responsively. I keep the right to remove any posting and moderate the forums if I feel necessary (although I never exercised it in my previous classes).</p>		
<p>Learning/Course Objectives*</p>	<p>This course is about telecommunication and information services. It is designed to teach the most fundamental principles of telecom and telecom market dynamics, and to discuss how the former interact with management and business practice. Students will study a number of case studies that will cover these principles in the context of real world situations that have been challenging practitioners in the main telecom and information companies around the world. Students are expected to learn about the dynamics of the structure of the industry and about the role of factors such as economies of scale, network externalities and regulation. The course relies heavily on learning-by-doing by offering frameworks that students can use to anticipate the opportunities and challenges that new information and communication technologies can bring.</p>		
<p>Grading Scale*</p>	<p>Final letter grades will be assigned as follows.</p> <p>A range (A-, A, A+) - Your total weighted average: $\geq 90\%$</p> <p>B range (B-, B, B+) - Your total weighted average: $81\% - < 90\%$</p> <p>C range (C-, C, C+) - Your total weighted average: $72\% - < 81\%$</p> <p>D (Failing) - Your total weighted average: $< 72\%$</p> <p>The distribution within a given letter grade range will be curved i.e. based on relative class performance</p>		
<p>Grading Rubric/explanation of grades (optional but encouraged)</p>	<p>Grading criteria for each homework assignment will be provided together with the assignment.</p>		
<p>Course/Topical Outline:*</p>	<p>Below is tentative schedule of lectures and due dates for deliverables:</p> <table border="1" data-bbox="394 1650 1481 1852"> <tr> <td data-bbox="394 1650 643 1852"> <p>Week of May 22</p> </td> <td data-bbox="643 1650 1481 1852"> <p>Review Canvas site, become familiar with the location of content on this site, and resolve any administrative issues with CMU</p> <p>Lecture 1: Course Introduction. Introduction to Telecom Management</p> <p>Lecture 2: Telecom Basics</p> </td> </tr> </table>	<p>Week of May 22</p>	<p>Review Canvas site, become familiar with the location of content on this site, and resolve any administrative issues with CMU</p> <p>Lecture 1: Course Introduction. Introduction to Telecom Management</p> <p>Lecture 2: Telecom Basics</p>
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Week of May 29	<p>Monday, May 29: University Holiday - Memorial Day</p> <p>Lecture 3: Telecom Switching and Introduction to Protocols</p> <p>Lecture 4: TCP/IP, IPv4 Addressing, Routing, IPv6, VoIP</p>
Week of June 5	<p>Thursday, June 8: Homework 1 Due</p> <p>Lecture 5: Networking Technologies in Data Center, Campus, LAN, MAN and WAN</p> <p>Lecture 6: Interworking, Peering</p>
Week of June 12	<p>Lecture 7: Micro-economics, Platforms, Sides, Network Effects I</p> <p>Lecture 8: Micro-economics, Platforms, Sides, Network Effects II</p>
Week of June 19	<p>Tuesday, June 20: Homework 2 Due</p> <p>Wednesday, June 21: Case Assignment Survey Due</p> <p>Thursday, June 22: Term Paper Proposal Due</p> <p>Lecture 9: Telecom Policy</p> <p>Lecture 10: Virtualization, Software Defined Networks, Software Defined Data Centers</p>
Week of June 26	<p>Thursday, June 29: Homework 3 Due</p> <p>Lecture 11: Content Delivery Networks, Cloud Computing</p> <p>Lecture 12: Wireless, Mobile, Connected World, Telematics I</p>
Week of July 3	<p>Tuesday, July 4: University Holiday - Independence Day</p> <p>Lecture 13: Wireless, Mobile, Connected World, Telematics II</p> <p>Lecture 14: Broadband</p>
Week of July 10	<p>Thursday, July 13: Term Paper Progress Report Due</p> <p>Lecture 15: CASE 1 Amazon, Apple, Facebook, Google</p> <p>Lecture 16: CASE 2 Akamai Technologies</p>
Week of July 17	<p>Lecture 17: CASE 3 Peer-to-Peer File Sharing and the Market for Digital Information Goods</p> <p>Lecture 18: CASE 4 Hulu</p>
Week of July 24	<p>Thursday, July 27: Homework 4 Due</p> <p>Lecture 19: CASE 5 Transforming Verizon</p> <p>Lecture 20: CASE 6 Cisco's Vision: A Smart+Connected World</p>
Week of July 31	<p>Tuesday, August 1: Term Paper Due</p>

	<table border="1" data-bbox="397 149 1482 558"> <tr> <td data-bbox="397 149 641 254"></td> <td data-bbox="641 149 1482 254">Lecture 21: CASE 7 Smartphone Industry in 2013: Samsung's Dilemma</td> </tr> <tr> <td data-bbox="397 254 641 285"></td> <td data-bbox="641 254 1482 285">Lecture 22: CASE 8 Google Car</td> </tr> <tr> <td data-bbox="397 285 641 558">Week of August 7</td> <td data-bbox="641 285 1482 558"> <p>Monday, August 7: Final Exam Due</p> <p>Wednesday, August 9: Optional Homework Due</p> <p>Thursday, August 10: Deadline to Post to Discussion Forums for Credit</p> <p>Lecture 23: Applications</p> <p>Lecture 24: Future of Telecom and Course Wrap Up</p> </td> </tr> </table> <p>Lecture videos will be available usually on Tuesdays and Thursdays. Case presentation dates will be determined after students enter their preferences in the Case Preferences Survey. All homework assignments will be posted about one week before the due dates. Exam will be posted a few days before the due date. Submission instructions will be provided with the assignments. The deadline for submitting your work is 11.59pm (EST) on the given date, unless otherwise specified. Late submissions will not be graded unless with reasonable excuse or prior arrangement with the instructor. Due dates for deliverables are subject to change. See the academic calendar for official university holidays. On the official university holidays, my TAs and myself may not be available for consultation although you may still email us and we will get back to you after the holiday.</p>		Lecture 21: CASE 7 Smartphone Industry in 2013: Samsung's Dilemma		Lecture 22: CASE 8 Google Car	Week of August 7	<p>Monday, August 7: Final Exam Due</p> <p>Wednesday, August 9: Optional Homework Due</p> <p>Thursday, August 10: Deadline to Post to Discussion Forums for Credit</p> <p>Lecture 23: Applications</p> <p>Lecture 24: Future of Telecom and Course Wrap Up</p>
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Plagiarism and cheating notice*	<p>Academic Dishonesty, Cheating and Plagiarism</p> <p>Everyone is expected to abide by the plagiarism policy of the school. Particularly pay attention to the following:</p> <ul style="list-style-type: none"> • Using someone else's work without proper citation is considered plagiarism. • Cutting and pasting without proper quotation marks and without citation is considered plagiarism. • Copying someone else's homework is considered plagiarism. • Copying answers from previous year's answer sheet is considered plagiarism. <p>Any violation of this policy will result in an automatic "F" grade and a report to the academic action committee. Please review CMU's policy here: http://www.cmu.edu/policies/documents/Academic%20Integrity.htm In case of doubt, contact me or the program director Allison Frankoski.</p>						
Course Policies & Expectations *	<p>Student Expectations</p> <p>A high level of individual student motivation and initiative will be expected. Students will be expected to use extensive online resources on telecommunications technology and management. Self-guided research, experimentation, and an entrepreneurial attitude are an important component of the course.</p> <p>Things to Do Right Away</p> <ul style="list-style-type: none"> • Purchase copies of the case studies via the course pack link in "Textbooks and Other Resources" section. • Familiarize yourself with the various features of the Canvas course website. In particular familiarize yourself with how to post/edit messages on the class discussion board. • Start thinking about your term paper topic and feel free to discuss any initial ideas with me. 						

Take Care of Yourself

Do your best to maintain a healthy lifestyle this semester by eating well, exercising, avoiding drugs and alcohol, getting enough sleep and taking some time to relax. This will help you achieve your goals and cope with stress.

All of us benefit from support during times of struggle. You are not alone. There are many helpful resources available on campus and an important part of the college experience is learning how to ask for help. Asking for support sooner rather than later is often helpful.

If you or anyone you know experiences any academic stress, difficult life events, or feelings like anxiety or depression, we strongly encourage you to seek support. Counseling and Psychological Services (CaPS) is here to help: call 412-268-2922 and visit their website at <http://www.cmu.edu/counseling/>. Consider reaching out to a friend, faculty or family member you trust for help getting connected to the support that can help.