

# Georgia Institute of Technology

## School of Economics

Fall 2008

### ECON 8803 Economics of Telecommunications Networks

*Tuesday and Thursday 3:05 p.m.*

<b><i>Instructor:</i></b>	<i>Mikhail Klimenko</i>
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<b><i>E-mail*:</i></b>	<i>Use the e-mail link on the t-square site of this course</i>
<b><i>Office Hours:</i></b>	<i>Tuesday 6:15 - 7:30 P.M., and by appointment</i>
<b><i>Course Webpage:</i></b>	<i>Important announcements and assignments will be posted on the t-square site set up for this course. All students must have access to the site and check it regularly.</i>

#### ***Course Overview***

This course examines, in both a theoretical and an empirical manner, the economic and public policy issues related to the telecommunications industry. The aim of the course is twofold: first, to provide you with understanding of the economic theory of pricing, competition, regulation and evolution of the industry; and second, to show how the theoretical tools can be employed to analyze the telecommunications industry in historical and future perspective.

We do not use a textbook in this course. Instead we will draw upon a series of papers, articles and chapters from edited volumes. Some of these reading materials are available on the World Wide Web. Articles in most journals are available in electronic format through Georgia Tech library. Those readings that are not available on the Web or through the library's database of electronic journals will be placed on reserve.

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\* E-mail caveat: Due to the large number of electronic messages, it will often not be possible for me to respond to individual electronic queries. Therefore, I urge you to be selective in sending me electronic mail, t-square messages, and etc. If you have questions, it would be best if you talk to me right before or after class or during the office hours.

At the beginning of the course, classes will be primarily lectures, as we review the economics of networks and telecommunications regulation. The second half of the course will be conducted in a seminar style with occasional lectures. This means that students will be required to lead the discussion of some of the reading materials. Prior to each discussion, students are required to distribute to the class a summary of the key ideas and issues of the material they are assigned. This may be presented in the bullet form or in the form of PowerPoint slides.

Some of the classes will be devoted to the discussion of the Harvard Business School case studies. The cases can be purchased on-line at the HBS Publishing website: <http://harvardbusinessonline.hbsp.harvard.edu/>. Before the discussion, I will prepare a few questions based on the case and you will have to write a report addressing those questions. I encourage you to prepare the case in groups (2-3 students in each group) and to submit joint reports on the cases. Each member of a group consisting of three students should also submit his/her evaluation of the other members' contributions toward the preparation of the final report. The evaluations should be on a scale from 1 to 100 and should measure the relative efforts made by group members rather than the share of the total work done for the report. The evaluations by individual members should be submitted to me in sealed envelopes together with the group report on the case. I will average the contribution scores awarded to each member by his group and multiply these averages by the group's score for the project. These will be the scores for individual group members for the project. I will not grade projects submitted without evaluations from every group member.

You are required to write a final paper for this course. You can pick any topic related to economic or public policy issues in the telecommunications industry. After discussing your topic with me, you should submit a one-page outline of the paper, which is due October 16th. You will be asked to make a short presentation of the main ideas of your paper in class. You don't have to submit your paper at the time of presentation. The paper is due at the official time of the final exam. (We don't have the final exam but I use its official time as the due time for the final paper.)

Grades will be based upon the following items: class participation (10%), Midterm I (20%), Midterm II (20%), written summaries of the assigned readings and case study reports (25%), final research paper and its presentation (25%). For each assignment you will receive an absolute and a standardized score. The final grade will be calculated by taking the weighted average of your standardized scores for the assignments. The cutoff for an 'A' will be one-half standard deviation. The cutoff for a 'C' will be minus one-half standard deviation. 'B' will be between the cutoffs.

Attendance in class is required. Students are responsible for all class lectures, case studies, and required readings and are expected to have read the required materials before the beginning of each class.

If you are taking the class pass/fail, you need to attend the class regularly, take both Midterms, submit the research paper and the case reports, take part in the case discussions, and obtain a 'C' in the class to get a satisfactory grade.

Important announcements as well as messages to individual students will be sent via the t-square website. All students must have and use an account on this site, available through the OIT.

*Class Schedule and Reading Assignments. (Subject to change as the course progresses.)*

Weeks	Dates	Reading assignments
1	August 19	<b>Introduction. Basics telecommunications concepts.</b>
	August 21	
2	August 26	<b>Industry Overview. Interactions among the production technology, regulatory policy, and industry structure.</b> <ul style="list-style-type: none"> <li>*W.W. Sharkey, "Representation of technology and production," in Martin Cave et al. (eds.), <i>Handbook of Telecommunications Economics</i>, Volume I, North-Holland: Amsterdam, 2002.</li> </ul>
	August 28	
3	September 2	<b>Theory of Economic Regulation.</b> <ul style="list-style-type: none"> <li>Viscusi, W. K., J. M. Vernon, J. E. Harrington (VVH), 2000, <i>Economics of Regulation and Antitrust</i>. Cambridge, Mass.: MIT Press. Ch. 10. Introduction to Economic Regulation</li> <li>*Brian Levy &amp; Pablo T. Spiller, 1994. "The Institutional Foundations of Regulatory Commitment: A Comparative Analysis of Telecommunications Regulation," <i>Journal of Law, Economics and Organization</i>, vol.10, n.2, pp.210-241.</li> </ul>
	September 4	
4	September 9	<b>Economic Theory of Natural Monopoly.</b> <ul style="list-style-type: none"> <li>VVH. Ch. 11. Theory of Natural Monopoly.</li> <li>*Seráfica, Ramonette, 1998, "Was PLDT a Natural Monopoly? An Economic Analysis of pre-reform Philippine telecoms," <i>Telecommunications Policy</i> 22, n. 4/5, pp. 359-387.</li> </ul> <b>Regulating Natural Monopoly. Review of regulatory plans in the telecommunications industry. Regulatory Reform.</b> <ul style="list-style-type: none"> <li>VVH. Ch. 12. Natural Monopoly Regulation.</li> <li>Sappington D. and D. Weisman, 1996, <i>Designing Incentive Regulation for the Telecommunications Industry</i>. The MIT Press. Ch. 3, 8, 9</li> <li>*Economides, Nicholas, "Telecommunications Regulation: An Introduction," in Richard R. Nelson (ed.) <i>The Limits and Complexity of Organizations</i>, Russell Sage Foundation Press, New York, 2005 <a href="http://www.stern.nyu.edu/networks/Telecommunications_Regulation.pdf">http://www.stern.nyu.edu/networks/Telecommunications_Regulation.pdf</a></li> </ul>
	September 11	
5	September 16	<b>Evolution from monopoly to competition in the telecommunications industry.</b> <ul style="list-style-type: none"> <li>VVH, Ch. 15. Dynamic Issues in Natural Monopoly Regulation: Telecommunications.</li> <li>*Brock, G. "Historical overview of telecommunications regulatory structure," in <i>Handbook of Telecommunications Economics</i>, V. 1, Ch. 2, pp. 44-75.</li> <li>*Vickers, John, 1998, Regulation, Competition and the Structure of Prices, <i>Oxford Review of Economic Policy</i>, v. 13, n. 1</li> </ul>
	September 18	

6	September 23	<ul style="list-style-type: none"> <li>*Armstrong, Mark and David Sappington, “Regulation, Competition and Liberalization,” Working Paper, University College of London and the University of Florida, 2005. <a href="http://ideas.repec.org/p/wpa/wuwpio/0505011.html">http://ideas.repec.org/p/wpa/wuwpio/0505011.html</a></li> <li>*Spulber, D., 2002 , “Competition Policy in Telecommunications,” in <i>Handbook of Telecommunications Economics</i>, V. 1, Ch. 2, pp. 478-507.</li> </ul>
	September 25	<b>Midterm I</b>
7	September 30	<b>Economics of Networks I: Externalities.</b> <ul style="list-style-type: none"> <li>Economides, Nicholas, <i>The Economics of Networks</i>, 1996, International Journal of Industrial Organization, v. 14, n. 2. (Also available at <a href="http://raven.stern.nyu.edu/networks/94-24.pdf">http://raven.stern.nyu.edu/networks/94-24.pdf</a>.)</li> <li>Oz Shy, (OS) <i>The Economics of Network Industries</i> Cambridge University Press, 2001. Chapter 5 (Sections 5.1 and 5.2).</li> <li>*Shapiro C. and H. Varian, 1999, <i>Information Rules</i>. Harvard Business School Press. Ch. 7.</li> <li>*Liebowitz, S. and Margolis, S., Ch. 3 in <i>Handbook of Telecommunications Economics</i>, V. 1, pp. 76-97.</li> </ul>
	October 2	
8	October 7	<b>Economics of Networks II: Interconnection and Access Pricing.</b> <ul style="list-style-type: none"> <li>Economides, Nicholas and Lawrence White, 1995, Access and Interconnection Pricing: How Efficient is the Efficient Component Pricing Rule? <i>The Antitrust Bulletin</i>, vol. XL, no. 3, pp. 557-579. (Also available at <a href="http://raven.stern.nyu.edu/networks/95-04.pdf">http://raven.stern.nyu.edu/networks/95-04.pdf</a>)</li> <li>OS Ch.5, Section 3.</li> <li>*Noam, E., “Interconnection Practices,” Ch. 9 in <i>Handbook of Telecommunications Economics</i>, V. 1, pp. 387-424.</li> </ul>
	October 9	
9	October 14	<p style="text-align: center;"><b><i>Fall Recess</i></b></p>
	October 16	<ul style="list-style-type: none"> <li><b>Case Study: Interconnectivity in China’s Telecoms Market. (Harvard Business School Case HKU597).<sup>1</sup></b></li> </ul>
10	October 21	<b>Economics of Networks III: Standardization and Compatibility.</b> <ul style="list-style-type: none"> <li>Besen, S. and J. Farrell., 1994, Choosing How to Compete: Strategies and Tactics in Standardization, <i>The Journal of Economic Perspectives</i>, v. 8, n. 2, p. 117-131.</li> <li>OS Ch.4.</li> <li>*Shapiro and Varian, Ch. 8, 9.</li> <li><b>Case Study: Adobe Systems, Inc. (Harvard Business School Case 9-801-199).</b></li> </ul>
	October 23	

<sup>1</sup> The Harvard Business School cases can be purchased on-line at the HBS website:  
<http://harvardbusinessonline.hbsp.harvard.edu>.

11	October 28	<p><b>Economics of the Internet infrastructure.</b></p> <ul style="list-style-type: none"> <li>• Kende, Michael, 2000, <i>The Digital Handshake: Connecting Internet Backbones</i>. Federal Communications Commission, Washington, D.C. <a href="http://www.fcc.gov/Bureaus/OPP/working_papers/oppwp32.pdf">http://www.fcc.gov/Bureaus/OPP/working_papers/oppwp32.pdf</a></li> <li>• *Economides, Nicholas, "The Economics of the Internet Backbone," in <i>Handbook of Telecommunications</i>. Amsterdam: Elsevier Publishers (2006). <a href="http://www.stern.nyu.edu/networks/ECONOMICS_OF_THE_INTERNET_BACKBONE.pdf">http://www.stern.nyu.edu/networks/ECONOMICS_OF_THE_INTERNET_BACKBONE.pdf</a></li> <li>• <b>Case Study: Google Inc. (Harvard Business School Case 9-806-105).</b></li> </ul>
	October 30	<p><b>Economics of Wireless Communications.</b></p> <ul style="list-style-type: none"> <li>• Gandal, N., Salant, D., and L. Waverman, 2003, "Standards in wireless telephone networks," <i>Telecommunications Policy</i>, v. 27, n. 4/5, pp.325-332.</li> <li>• *Joshua Gans, Stephen King and Julian Wright, "Wireless Communications," in <i>Handbook of Telecommunications Economics</i>, Volume II, Martin Cave et.al. (eds.), North-Holland: Amsterdam, (forthcoming). Download from the author's website: <a href="http://www.mbs.edu/home/jgans/research.htm">http://www.mbs.edu/home/jgans/research.htm</a></li> <li>• *Jerry Hausman, "Mobile Telephony" in <i>Handbook of Telecommunications Economics</i>, Volume I, Martin Cave et.al. (eds.), North-Holland: Amsterdam, (2002).</li> </ul> <p>*Kano, S., 2000, Technical Innovations, Standardization and Regional Comparison: A Case Study in Mobile Communications. <i>Telecommunications Policy</i>, Volume 24, Issue 4, p. 305-321.</p>
12	November 4	<ul style="list-style-type: none"> <li>• <b>Case Study: NTT DoCoMo: Establishing Global 3G Standards. (Harvard Business School Case HKU241.)</b></li> </ul> <p><b>Spectrum Auctions.</b></p> <ul style="list-style-type: none"> <li>• Federal Communications Commission (FCC). "All About Auctions." <a href="http://library.lp.findlaw.com/articles/00026/003028.pdf">http://library.lp.findlaw.com/articles/00026/003028.pdf</a></li> <li>• McAfee, P. and J. McMillan, Analyzing the Airwaves Auctions, <i>Journal of Economic Perspectives</i>, Winter 1996, vol. 10, n.1, p. 159-175.</li> <li>• McMillan, J., "Why Auction the Spectrum?" <i>Telecommunications Policy</i>, April 1995, 19, p. 191-99</li> </ul>
	November 6	
13	November 11	<ul style="list-style-type: none"> <li>• *Noam, Eli, "Spectrum Auctions: Yesterday's Heresy, Today's Orthodoxy, Tomorrow's Anachronism. Taking the Next Step to Open Spectrum Access." <i>Journal of Law &amp; Economics</i> 1998, 41 (2), p. 765-90. <a href="http://www.journals.uchicago.edu/JLE/journal/contents/v41nS2.html">http://www.journals.uchicago.edu/JLE/journal/contents/v41nS2.html</a></li> <li>• *Lehr, W., Merino Artalejo, M., Eisner Gillet, S., 2003, "Software Radio: Implications for Wireless Services, Industry Structure, and Public Policy," in <i>Communications and Strategies</i> 49, p. 15-42 <a href="http://tprc.org/papers/2002/62/Software_Radio_Lehr_Gillett_Fuencis_Aug2002.pdf">http://tprc.org/papers/2002/62/Software_Radio_Lehr_Gillett_Fuencis_Aug2002.pdf</a></li> </ul>
	November 13	<b>Midterm II</b>

14	November 18	<p><b>Satellite and Optical Communication Networking</b></p> <ul style="list-style-type: none"> <li>Federal Communications Commission (FCC). “Regulating Satellite Networks: Principles and Process.” <a href="http://www.fcc.gov/connectglobe/sec8.html">http://www.fcc.gov/connectglobe/sec8.html</a></li> <li>*Ch. 3, “Scarce Resources: Radio Spectrum and Orbital Positions,” in <i>An Introduction to International Telecommunications Law</i> by C. Kennedy and V. Pastor, Artech House: Norwood, MA, 1996.</li> <li>*Macauley, Molly K. “Allocation of Orbit and Spectrum Resources for Regional Communications: What's at Stake?” <i>Journal of Law &amp; Economics</i> 1998, 41 (2), p. 737-64. <a href="http://www.journals.uchicago.edu/JLE/journal/contents/v41nS2.html">http://www.journals.uchicago.edu/JLE/journal/contents/v41nS2.html</a></li> </ul>
	November 20	
15	November 25	<p><b>Global Telecommunications. Trade in telecommunications services.</b></p> <ul style="list-style-type: none"> <li>Cowhey and Klimenko, 2001, “The WTO Agreement and Telecommunications Policy Reform.” Download from <a href="http://econ.worldbank.org/view.php?id=1723">http://econ.worldbank.org/view.php?id=1723</a></li> <li>Klimenko, M. “International Trade Policies and Agreements on Compatibility Standards for Industries with Network Externalities,” mimeo.</li> <li>*Frieden, R., “Balancing Equity and Efficiency Issues in the Management of Shared Global Radiocommunication Resources,” <i>24 University of Pennsylvania Journal of International Economic Law</i>, No. 2, 289-327 (Summer, 2003). <a href="http://papers.ssrn.com/sol3/papers.cfm?abstract_id=360541">http://papers.ssrn.com/sol3/papers.cfm?abstract_id=360541</a></li> </ul> <p><i>Official school holiday</i></p>
	November 27	
16	December 2	<ul style="list-style-type: none"> <li><b>Case Study: Orbital Sciences Corporation: ORBCOMM. (Harvard Business School Case 9-598-027.)</b></li> </ul> <p><b>Student Presentations.</b></p>
	December 4	