**CEM 1003: INFRASTRUCTURE & URBAN PROSPERITY**

**Winter 2019**

**1. INSTRUCTOR** Nikolaos Kalyviotis nikos.kalyviotis@utoronto.ca

**2. LECTURES** Wednesday, 10am-12pm (GB217)

**3. GRADING** Coursework (Academic Essay & Problem discussion) 50%;

Term Project 40% (5% project proposal; 35% presentation slides; 10% presentation); Opposition/ Discussion on Another Student's Term Project 10%

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| **4. KEY DATES** | Jan 11: First day of classes |
|  | Jan 11: Academic Essay Set – Theory: Expected utility hypothesis |
|  | Jan 16: Academic Essay Set – Real data: Expected value under risk |
|  | Jan 23: Problem 1 (discussion): Social Value of Infrastructure  |
|  | Jan 30: Problem 2 (discussion): Economic Value of Infrastructure |
|  | Feb 6: Problem 3 (discussion): Environmental Value of Infrastructure  |
|  | Feb 13: Academic Essay Set – Discussion/ Term Project Examples |
|  | Feb 20: Reading Week – Project Proposal due |
|  | Feb 27: Academic Essay due |
|  | Mar 6: Problem 4 (discussion): Linearity in Economics |
|  | Mar 13: Term project paper and presentation slides due |
|  | Mar 20: Term project presentations |
|  | Mar 27: Term project presentations |
|  | Apr 3: Term project presentations |
|  | Apr 3: Last day of classes |

**5. COURSE OBJECTIVES**

Following this course, students should be able to answer the following questions:

1. What is the role of infrastructure in urban economies? How does infrastructure affect an urban economy? How does an economy influence the development of urban infrastructure?

2. What methods or theories from economics are used or could be used for urban infrastructure planning? What are the assumptions of these methods and when are they appropriate?

3. What factors, other than economic considerations, give rise to the development of large urban infrastructure systems?

**6. COURSE NOTES, READINGS AND TEXTBOOK**

Lecture material will mainly be presented on PowerPoint and chalkboard. It is expected that all students will attend the class and learn through writing down the notes and examples.

**7. COURSE OUTLINE AND RELEVANT READINGS**

**1. Introduction** – overview of the course; introduction to sub-disciplines of economics; the concept of value.

Smith A (1776) An Inquiry into the Nature and Causes of the Wealth of Nations. The Glasgow Edition. New York: Oxford University Press.

Mill JS (1848) Principles of Political Economy. London; Longmans, Green and Co.

Meadows DH, Meadows DL, Randers J & Behrens WWIII (1972) The Limits to Growth. Universe Books. (Club of Rome)

Bonnedahl KJ & Eriksson J (2011) The role of discourse in the quest for low-carbon economic practices: A case of standard development in the food sector. European Management Journal, 29(3): 165-180.

**2. Expected utility hypothesis** (Academic Essay presentation and analysis) – Von Neumann–Morgenstern Utility theorem; Expected utility hypothesis; Mathematical optimization

Von Neumann J & Morgenstern O (1953) Theory of Games and Economic Behavior. Princeton, NJ. Princeton University Press

Saylor Academy (2012) Risk Management for Enterprises and Individuals (v1.0)

**3. Social Value of Infrastructure** – coverage & needs analysis of infrastructure; hierarchy of needs; stakeholder analysis; strict utility choice mode.

Maslow A (1954) Motivation and personality. New York, NY: Harper
Winters PL, Cleland F, Mierzejewski E & Tucker L (2001) Assessing Level of Service Equally Across Modes. A report for the Florida Department of Transportation and NCTR: 1-53.

**4. Environmental Value of Infrastructure** – environmental impact; CO2 emissions of infrastructure; EXIOBASE 3; types of emissions

Stadler K, Wood R, Bulavskaya T, Södersten CJ, Simas M, Schmidt S, Usubiaga A, Acosta-Fernández J, Kuenen J, Bruckner M, Giljum S, Lutter S, Merciai S, Schmidt J-H, Theurl M-C, Plutzar C, Kastner T, Eisenmenger N, Erb K-H, de Koning A, & Tukker A (2018) EXIOBASE 3: Developing a Time Series of Detailed Environmentally Extended Multi-Regional Input-Output Tables: EXIOBASE 3. Journal of Industrial Ecology: 1-14.

**5. Financial Decision Making** – time-value of money; discounting of cash flows; comparison of alternatives; cost-benefit analysis; internal rate of return; risk and return; public and private sector perspectives.

Moore, M.A., A.E. Boardman and D.H. Greenberg (2001)

The Social Discount Rate in Canada, in Aidan R. Vining and John Richards, eds., Building the Future: Issues in Public Infrastructure in Canada, p. 73- 130.

**6. Microeconomic Principles** – theory of the firm (fixed and variable costs; marginal costs and benefits; long-run and short-run effects; production functions; returns to scale); consumer theory (marginal utility, indifference curves, rational consumption); supply and demand; elasticities, consumer surplus.

 Perloff, J.M. (1999) Microeconomics, Addison Wesley Longman.

Nowlan (2000) A surplus value model for estimating the economic impact of achieving environmentally sustainable transportation in the Quebec-Windsor corridor. (http://www.chass.utoronto.ca/~nowlan/papers/papers.htm)

**7. Welfare Economics** – Pareto criterion; general equilibrium; the compensation principle; social welfare functions.

Johansson, P-O. (1991) An Introduction to Modern Welfare Economics, Cambridge University Press, Chapters 1-3, p.1-39.

Major, C.D. (1974) Multi-objective Redesign of the Big Walnut Project, in R. de Neufville, and D. Marks, eds., System Planning and Design: Case Studies in Modeling, Optimization, and Evaluation., Prentice-Hall, p. 322-337.

**8. Economic Analysis of Transportation Infrastructure** – overview of transportation economics; pricing of transportation infrastructure (first and second-best pricing of bridges and highways)

Oum, T.H. et al., eds. (1997) Transport Economics, Chapter 1: Introduction, Harwood Academic Publishers, xi-xvii.

**9. Urban Economics** – the market for land; the mono-centric city model; overview of urban economic models.

Mills, E.S., and Hamilton (1989) Introducing Land and Land Rents Into Price Theory, Chapter 5 in Urban Economics, 4th Edition; and Theoretical Analysis of Urban Structure, Chapter 6 in Urban Economics, 4th Edition.

Brueckner, J.K. (2001) Urban Sprawl: Lessons from Urban Economics, in Brookings-Wharton Papers on Urban Affairs, W.G. Gale and J. Rothenberg, eds.

**10. Economics of Major Infrastructure Investment** – challenges in assessing economic impacts of large-scale infrastructure investments; measures of benefits; evaluation of changes in net income.

Quinet, E., and R. Vickerman, eds. (1997) Chapter 1: Introduction, in Quinet, E., and R. Vickerman, eds. The Econometrics of Major Transport Infrastructures, MacMillan, p.1-17.

Rephann, T.J. (1993) Highway Investment and Regional Economic Development: Decision Methods and Empirical Foundations, Urban Studies, Vol. 30, No. 2, 437-450.

**11. Macroeconomic Principles** – challenges in assessing economic impacts of large-scale infrastructure investments; measures of benefits; evaluation of changes in net income.

Quinet, E., and R. Vickerman, eds. (1997) Chapter 1: Introduction, in Quinet, E., and R. Vickerman, eds. The Econometrics of Major Transport Infrastructures, MacMillan, p.1-17.

Rephann, T.J. (1993) Highway Investment and Regional Economic Development: Decision Methods and Empirical Foundations, Urban Studies, Vol. 30, No. 2, 437-450.

**12. Long-term Patterns in Infrastructure Development** – origins of urban disorder; theories of the development of cities; achievement of urban order; technology cycles.

Hall, P. (1998) Cities in Civilization, Chapter 21: The Challenge to the Urban Order, p.611-620; Chapter 29: The Achievement of the Urban Order, p.932-939, Phoenix,

Berry, B.J.L. (1991) Long-wave Rhythms in Economic Development and Political Behaviour, John Hopkins Press, pages 46-56 and 76-86.

**8. ASSESSMENT GUIDELINES AND WEIGHTING**

Assessment for the course is split with 50% of the total mark based on coursework and class contribution and 50% end of presentations. The coursework (50%) is an individual essay which, amongst other things, attempts to link theory and practice and to allow you to apply both knowledge and understanding. The student would write a 2,500 word essay on the topic chosen including discussion of the theory and an analysis of the real life example. The essay must engage the question at a critical level. An essay which is largely descriptive and lacking in analysis will be marked down accordingly.

**Can you evaluate the value of a transport infrastructure under uncertainty using the Expected utility hypothesis?**

(Review of the paper: Ramos, G., Daamen, W., & Hoogendoorn, S. (2014). A State-of-the-Art Review: Developments in Utility Theory, Prospect Theory and Regret Theory to Investigate Travellers' Behaviour in Situations Involving Travel Time Uncertainty. *Transport Reviews,* *34*(1), 1-22.)

The term project is an individual research project that consists of a project proposal (5%), presentation slides (25%) and presentation (10%). The purpose of the term project is to undertake a focused study of the value impacts of a large infrastructure system development in the context of cities. The presentation is an opportunity to explore the central questions of the course (refer to course objectives) through a case study. Another student should be the main discussant (10%) Details of the term project will be provided during the term.

**9. COURSE OUTLINE AND RELEVANT READINGS**

“Students in graduate studies are expected to commit to the highest standards of integrity and to understand the importance of protecting and acknowledging intellectual property. For example, it is assumed that they bring to their graduate studies a clear understanding of how to cite references appropriately, thereby avoiding plagiarism. See for example, How Not to Plagiarize. Regarding plagiarism, the Code includes the following statements:

B.i.1. It shall be an offence for a student knowingly: (d) to represent as one's own idea or expression of an idea or work of another in any academic examination or term test or in connection with any other form of academic work, i.e., to commit plagiarism. Wherever in the Code an offence is described as depending on "knowing," the offence shall likewise be deemed to have been committed if the person ought reasonably to have known.

Other academic offences include the possession and/or use of unauthorized aids in examinations, submitting the same paper for different courses, forgery (whether of academic records or other documents), concocting facts or references to sources, personating someone, and other forms of cheating and academic dishonesty. Please refer to sections B.i.1. and B.i.3. in the Code for detailed descriptions of offences applicable to students.” Source: http://www.sgs.utoronto.ca/facultyandstaff/Pages/Academic-Integrity.aspx