CIVL 4034 Freight Transportation builds on core transportation courses by adapting the concepts and theories of passenger transportation to the realm of freight transportation with an emphasis on truck patterns. This topic is regionally important given the prominent role of nearby Peel Region as the largest Canadian hub for freight. The course will cover topics such as traditional freight modelling assumptions, the demand for goods movement arising from economic markets, trip generation models, truck movement models such as truck tours, societal impacts of freight, and future impacts of connected and autonomous (CAV) vehicles. In addition, the course will introduce students to optimization problems such as the transportation problem, p-median, and capacitated plant. Prerequisites: LE/CIVL 3260 3.00.

INSTRUCTOR(S)

<table>
<thead>
<tr>
<th>Name</th>
<th>Section / Format / Term</th>
<th>Contact Email</th>
<th>Contact Phone</th>
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</thead>
<tbody>
<tr>
<td>Gingerich, Kevin</td>
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</tbody>
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ADDITIONAL INFORMATION

TOPICS AND CONCEPTS

This course is designed to give upper-level civil engineering undergraduates a solid understanding of the major theories, principles and hands-on tools used in the field of freight transportation. The course consists of two 1.5-hour lectures every week and a 2-hour tutorial every other week.

The course will consist of five modules that teach students the fundamental theory and application of principles related to freight transportation as a direct contrast to passenger travel patterns. Module one will provide an overview of the need for firms to transport goods as part of their supply chain, the possible modes of transport available to them, and important considerations needed to minimize the subsequent transportation costs. This will lead to Module 2, where students learn to minimize transport costs by formulating and solving various types of optimization problems. In Module 3, students will learn about the factors influencing freight trip generation and apply these concepts towards advanced models. Module 4 will then teach students to estimate the movement patterns arising from estimated truck trips on the road network using models of truck tours and route choice. Module 5 will conclude the course with additional relevant freight transportation topics.

Module 1 · Introduction to freight transportation
  • Modes of freight transportation
  • Supply chain logistics
  • Inventory economics and management

Module 2 · Linear programming theory and application
  • Optimization problem formulation
  • Simplex method
  • Location-allocation problems
• Traveling salesman problem

**Module 3 · Freight trip generation**
- Variables influencing freight trips
- Trip generation models
- Multi-Regional Input-Output (MRIO) models
- Freight mode choice

**Module 4 · Truck movement modelling**
- Truck tour models
- Route choice models

**Module 5 - Additional topics such as:**
- Freight signal priority
- Warehousing
- Truck parking

**LIST OF LEARNING OUTCOMES AND EXAMPLES OF**

By the end of the course, students should be able to:
1. Explain the concepts, assumptions, and limitations to freight transportation
2. Differentiate between factors generating passenger and freight trips
3. Identify the major characteristics of supply chain management and strategies to reduce freight costs
4. Formulate and solve optimization problems using appropriate software
5. Arrange the individual components of models used to simulate the travel patterns of trucks
6. Examine the social and environmental impacts of freight transportation on the general public

**GRADED ASSESSMENT**
- Participation: 5%
- Assignments: 20%
- Term Project: 25%
- Midterm Examination: 20%
- Final Examination: 30%

**ADDITIONAL INFORMATION**

No textbook is required for purchase since all necessary information will be provided by the instructor. However, the following references are suggested reading materials for the course:

**ACADEMIC INTEGRITY LINKS**
- Senate Policy on Academic Honesty - http://secretariat-policies.info.yorku.ca/policies/academic-honesty-senate-policy-on/
- Academic Integrity - http://lassonde.yorku.ca/academic-integrity

**STUDENT LINKS**
- Student Rights and Responsibilities - http://oscr.students.uit.yorku.ca/student-conduct
- Religious Observance - https://w2prod.sis.yorku.ca/Apps/WebObjects/cdm.woa/wa/regobs
• Student Accessibility Services (SAS) - https://accessibility.students.yorku.ca/
• York University’s Policies on Sexual Violence - http://secretariat-policies.info.yorku.ca/policies/sexual-violence-policy-on/
• York University’s Policies on Gender/LGBTQ*/Positive Space - http://rights.info.yorku.ca/lgbtq/

LAND ACKNOWLEDGEMENT
• We acknowledge our presence on the traditional territory of many Indigenous Nations. The area known as Tkaronto has been care taken by the Anishinabek Nation, the Haudenosaunee Confederacy, the Huron-Wendat, and the Métis. It is now home to many Indigenous Peoples. We acknowledge the current treaty holders, the Mississaugas of the New Credit First Nation. This territory is subject of the Dish With One Spoon Wampum Belt Covenant, an agreement to peaceably share and care for the Great Lakes region.
• The Indigenous Framework for York University: A Guide to Action can be found here: http://indigenous.info.yorku.ca/
• Meaning of a land acknowledgement: http://healthydebate.ca/opinions/indigenous-land-acknowledgements

Many courses utilize Moodle, York University’s course website system. If your course is using Moodle, click here to access it.

Moodle @ York University