1. GENERAL OVERVIEW AND OBJECTIVES

The course focuses on the analysis and forecasting of the demand for transport services. A range of concepts and techniques are used in practice to quantify and model transport demand. This occurs at various levels, from the local level (relating to traffic impacts of individual sites or projects), to the level of metropolitan transport demand modeling, typically undertaken as a part of strategic long-term transport-land use planning, or the evaluation of large-scale urban projects. The aim of the course is to explore the characteristics of transport demand at these various levels, and to develop a working knowledge of the main concepts and quantitative techniques used in this field. We do this in the context of the realities and limitations of the South African context and consider how modeling practice needs to evolve in response to contemporary issues.

The aims of the course are to provide students with:

- A basic understanding of the principles, theory, and application of transport demand data collection, analysis and modelling;
- Practical experience in applying conventional modelling approaches to solving a simple transport problem; and
- An introduction to the limitations of traditional modelling approaches, implications for modelling in developing countries, and emerging alternative approaches.

The approach of the course is to use a mix of lectures, problem-solving sessions, and demonstrations to impart a practical understanding of the material. Students will be encouraged to critically assess the applicability of the material covered in the South African planning context. Students will also get an opportunity to apply their knowledge to a multi-step practical modeling problem that will form the assignment for the course. This is done on a spreadsheet package, as we do not require students to learn to use formal transport modeling software for the purpose of the course.

Knowledge assumed to be in place includes:

- Basic knowledge of statistics and probability at a post-graduate engineering level;
- Familiarity with a spreadsheet software package like Excel.

2. DELIVERY FORMAT

<table>
<thead>
<tr>
<th>Name of lecturer</th>
<th>Telephone No. and Email Address</th>
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<tbody>
<tr>
<td>Professor Christo Venter</td>
<td>Department of Civil Engineering</td>
</tr>
<tr>
<td></td>
<td>University of Pretoria, Hatfield, Pretoria</td>
</tr>
<tr>
<td></td>
<td>Tel. (012) 420-2184</td>
</tr>
<tr>
<td></td>
<td><a href="mailto:christo.venter@up.ac.za">christo.venter@up.ac.za</a></td>
</tr>
</tbody>
</table>
Guest lecturers are also used to present practical case studies.

**Format:**

The course will be delivered entirely online as follows:

- Lecture material will be available for study ahead of time
- Online lectures will be delivered on the lecture dates, between 8:30 and 13:00 daily. A suitable online tool like Microsoft Teams will be used. Recordings of the lectures will be made available afterwards.
- Students will be doing tutorials in the afternoons, for discussion at the start of the next day.
- A large assignment will follow the lecture week, for completion over the next several weeks.

**Lecture dates:**

Tuesday 11 to Friday 14 August 2020.

3. **STUDY MATERIALS**

The prescribed material for the course consists of a textbook:


Selected pages from this text will be made available to students as part of the course notes. Note that the 3rd edition of the text (2001) may also be used as a reference, but students using this edition have to take responsibility for checking compatibility of the versions.

Additional material as indicated in this guide will also be provided.

4. **LECTURE CONTENT AND PROGRAMME**

1. **Introduction**
   - Models and their role in urban transport planning
   - Evolution of urban travel demand models
   - The structure of the conventional transport modeling approach
2. **Data and space**
   - Sampling
   - Data collection methods
   - Emerging methods and new technologies: GPS, web-based surveys, panels and continuous data strategies
   - Zones and networks
3. **Trip generation**
   - Basic concepts
   - Growth factor methods
   - Regression analysis
   - Cross-classification approaches
4. **Trip distribution**
   - Basic concepts
   - Growth factor models
   - Synthetic (gravity) models
5. **Modal split**
   - Introduction
ii. Diversion curves

6. **Discrete choice models and stated preference analysis**
   i. Theory of travel choices
   ii. Model specification and estimation of discrete outcome models
   iii. Stated preference analysis

7. **Traffic assignment**
   i. Basic concepts
   ii. All-or-nothing and stochastic methods
   iii. User equilibrium

8. **Practical modeling issues and applications**
   i. Software packages
   ii. Case study: transport modeling in South Africa

9. **Critique of the conventional approach and new approaches**
   i. Critique of the four-step model
   ii. Activity-based approaches
   iii. Agent-based simulation models

<table>
<thead>
<tr>
<th>DAY</th>
<th>MORNING SESSION (8:30 TO 13:00)</th>
<th>REQUIRED READING</th>
<th>TUTORIAL</th>
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<tbody>
<tr>
<td>Tuesday</td>
<td>Course introduction</td>
<td>O+W 1.4 - 1.7</td>
<td>Linear regression</td>
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<td></td>
<td>Transport data collection</td>
<td>O+W 3.1.1 - 3.1.1.2</td>
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<td>Trip generation</td>
<td>O+W 3.2.1</td>
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<td>O+W 3.3.1 –3.3.2</td>
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<td>O+W 4.1 – 4.3.1</td>
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<td>Wednesday</td>
<td>Trip distribution</td>
<td>O+W 5.1 – 5.3</td>
<td>Gravity modelling</td>
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<td>Modal choice</td>
<td>O+W 5.5</td>
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<td>O+W 5.8.1 – 5.8.6</td>
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<td>O+W 6.1 – 6.4</td>
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<tr>
<td>Thursday</td>
<td>Discrete choice models</td>
<td>WK&amp;M 11.1 – 11.5.6</td>
<td>Logit modelling</td>
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<td>Stated Preference analysis</td>
<td>O+W 3.4.1 – 3.4.2.2</td>
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<td></td>
<td>Transport networks</td>
<td>O+W 3.4.2.7</td>
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<tr>
<td>Friday</td>
<td>Traffic assignment</td>
<td>O+W 10.1 – 10.3</td>
<td>Intro to practical assignment</td>
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<td>Case study</td>
<td>O+W 10.5.1, 10.5.3</td>
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<td>Critique and new approaches</td>
<td>O+W 10.6, 10.7, 10.8</td>
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<td>O+W 11.1 - 11.2.2</td>
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5. ADDITIONAL READING LIST

In addition to the sections of the texts indicated in the above table, the following two articles form part of the prescribed reading:


Optional reading (not for examination):


Cost: R 9000.00 CPD points: 4

For registration link and further enquiries contact: Janine: civilcourses@sun.ac.za