Urban Modelling and Decision Support

AH2307
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Course Content

“The main contents are

- discrete choice theory, the multinomial and nested logit model,
- network equilibrium and assignment theory for car and public transport,
- and the development and application of a simple forecast and analysis system”

Learning outcomes

After the course you should be able to:

- Describe and critique the application of rational-based models in decision-making processes
- Apply urban theories to build a simple forecasting system
- Analyze policy changes in the urban system and produce decision support for decision-makers
- Write a report of a simple transport planning study

These overall learning objectives are further qualified as follows.

After completed course you should be able to:

- Describe and apply central methodologies: discrete choice theory, the multinomial and nested logit model, network equilibrium and assignment theory for car and public transport (KF2)
- critically, independently and creatively identify, formulate and approach relevant and complex societal issues, which include economical, ecological and social sustainability
- use an integrated transport and land use forecasting system to model, simulate, forecast and evaluate societal policies (which includes changes to the transport system or land use system) to address relevant societal issues, including sustainability
- clearly account for and discuss conclusions from an evaluation of a policy proposal including changes to the transport and/or land use system
- plan and implement an assessment (evaluation) of public policies to address societal issues using adequate scientific methods
- ability to identify the need for further knowledge
- critique scientific and methodological approaches used in the project

So in all modesty

After the course you should be able to help the public and the policy-makers improve society in terms of our built environment

Examination

Examination

- PROA - Project, 4.5 credits,

  grade scale: P/F
- TEN1 – Written Examination(digital), 3.0 credits,

  grade scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

PROA

To recieve Pass on PROA, it is required to recieve Pass on both items
(i) **LABS** and the (ii) **PROJECT**:
(i) **LABS:** three Labs with due dates throughout the course
LAB 1: Logit (useful for the Project)
LAB 2: IIA (useful for the written exam)
LAB 3: Gravity (useful for the written exam)

- LABS are graded Pass/Fail
- The deadlines of the labs is to be found in the Schedule, on the Home Page in Canvas. Submission after deadline will be considered as Fail.
- You will received grading and comments after submission. If you received comment on revision, you have to re-submit your lab. Only one re-submission per lab is allowed. late submission after deadline will be considered as Fail.

PROA contd

(ii) **PROJECT**

The examination of the PROJECT consists of two parts:

a **written report** and an **oral assessment**.

- You will use a simple travel demand model to analyze land-use and transport policy measures in stylized city of Stockholm
- You will learn how to translate the mathematical formulation into python code
- You can choose to do your project individually or in a group of two
- Write an **individual** report
- Take an **individual** oral assessment.

PROA contd

- The deadline for submission of your project is **24:00 December 16th 2023.** You will have to submit your **python code** and your **report.** Submission after deadline will be considered as **Fail**.
- The oral assessment will be carried out between **December 18th and December 19th 2023, in-person on campus, not digital.** If you are not able to complete an in-person oral assessment given the available time slot, your project will be considered as **Fail**.
- Based on your submitted resport and performace of oral accessment, project is graded **P/F**
- If you received comment on revision, you have to re-submit your project report. Only one re-submission is allowed. The deadline for re-submission is **24:00 January 20th 2024**. Submission after deadline will be considered **Fail**.
- If you get Fail on the first and the second project submission, you have to apply for the course when is given the next time and register for the exam.

PROA contd

- REPORT: The **written report** has a word limit of 3000 words.
- Grading: The quality of the report is assessed on the following criteria for Pass:
- Readability: language must be understandable
- Completeness: required results need to be presented
- Structure: organization of the report helps understanding, with a focus on crucial results and assumptions
- Analysis: results need to be explained with respect to theory.
- Faulty arguments and inconsistent results can be accepted only to a minor degree.

PROA contd

(ii) PROJECT (contd)

Oral assessment: The purpose is to ensure that every student is able to present and answer questions about the entire assignment and solution.

In addition to Pass on the written report, the student need also to Pass an oral assessment: every student shall be able to present and answer questions about the entire assignment and solution.

Make sure that you know your way around the code

No presentation is required.

There will be time slots available to book on-line. Information on how to book will be made available on Canvas.

Exercises

- There are two exercises that must be submitted in canvas according to the deadline. These two exercises are not graded. The exercises help you to understand the theory better but also facilitating you in preparing the digital exam in the canvas environment.

TEN1 Written examination

Digital examination on campus with locking down computers

https://intra.kth.se/en/utbildning/examination/salskrivning/med-dator/nedlasning-1.1109032

- Remember to register for the exam! No late registration is allowed for digital examination!
- Answers should be provided only in the Canvas examination room. Any other submitted material outside the Canvas examination room will not be graded.
- Answers should be given in English.
- There will be a exersice on the examination available later on canvas.

TEN1 Written examination

What can you bring

- ID card! Must have!
- Only paper english dictionary is allowed
- Only pocket calculator is allowed
- Pen/pencil, eraser, papers will be provided and collected after the exam by the exam invigilators
- Your ID cards and all the educational aids you bring will be controlled by the exam invigilators.

TEN1 Written examination

There will be FOUR *exam categories/questions*

1. Demand modelling with Logit (around 70p)
2. Assignment (around 40p)
3. LUTI (around 20p)
4. Models and appraisal (around 10p)

The written exam (TEN1)

The learning objectives are mapped to FOUR questions/categories in the examination as follows:

- describe and apply central methodologies: discrete choice theory, the multinomial and nested logit model, (TEN cat 1); network equilibrium and assignment theory for car and public transport (TEN category 2).
- critically, independently and creatively identify, formulate and approach relevant and complex societal issues, which include economical, ecological, and social sustainability PRO
- use an integrated transport and land use forcasting system to model, simulate, forecast and evaluate societal policies (which includes changes to the transport system or land use system) to address relevant societal issues, including sustainability PRO
- clearly account for and discuss conclusions from an evaluation of a policy proposal including changes to the transport and/or land use system PRO
- plan and implement an assessment (evaluation) of public policies to address societal issues using adequate scientific methods PRO
- have the ability to identify the need for further knowledge (TEN cat 4)
- critique scientific and methodological approaches used in the project TEN cat 4

TEN1 Written exam

To *pass*, you will have to exhibit knowledge in all FOUR categories/questions

To pass the exam, the following criteria need to be fulfilled:

- Category/Question 1 > 20p
- Category/Question 2 > 12p
- Category/Question 3 > 5p
- Category/Question 4 > 3p

If you do not pass exactly ONE category, the grade will be FX.

If you do not pass two or more categories, the grade will be F.

Grading on written exam

The written exam is graded {A-F, FX}. Grading of written exam, conditional on passing above criteria on each category/question, is based on total score, with grading thresholds.

- A : The student has presented solutions to all parts of the problem. The solutions are clearly motivated, correct and the results are discussed thoroughly and quantitatively, when appropriate. Also, clear mathematical arguments are given, when appropriate. Minor obvious typos can be accepted.
- C: The student's solutions treat most of the problem and is largely correct but may contain computational errors and lack motivation. A qualitative discussion of the results is present. Faulty arguments and inconsistent results can be accepted to a minor degree.
- E: The student's exam demonstrates a basic understanding of the major issues and concepts treated in the problem. The student has attempted to make proper progress towards a solution to the problem. A discussion at the basic level is present.
- F: A grade F is given if the criteria for a grade E are not achieved.

FX

- If you recieve FX on the written examination, you will be given a supplemental assignment. The deadline for the supplemental assignment will be 15 days.
- Submittion after the given deadline will not be graded and your written examination will be graded as F.
- If you pass the supplemental assignment, your written examination will be greaded as E.
- If you get F on the supplemental assignment, you have to apply for re-exam and re-exam princeples apply.

F

- If you received F on the written examination, you have to apply for re-exam according to the scheduled Re-exam period by KTH.
- Only one re-exam is allowed. If you received F on the re-exam, you have to apply for the course when is given the next time and register for the exam.
- If you received Fx on the re-exam, the FX principles apply.

Plussning

- Plussning is not allowed

- *However*, if there is re-take written exam given in week 16 2024, it will be possible to plussa on the *written exam* (TEN1)
- No additional written examination will be given for plussning.

The oral assessment for PROA will only take place at dates defined previously (see ii PROJECT)

Plussning: To take another examination to recieve a higher grade, when already have achieved a passing grade.

Final Grade

When recieved a Passing grade on PROA,

the *final grade* will be equal to the grade given on the written examination TEN1.

Learning outcomes vs examination

	PROJECT	Written Exam categories			
		1 Logit	2 Ass.	3 LUTI	4 Mod.
Describe rational-based models for decision support	x	xx	xx	xx	xx
Critique rational-based models for decision support	x	x			xxx
Apply urban theories to build simple forecasting systems	xxx	x	x	x	x
Analyze policy changes in the urban system	xxx				
…and provide decision support for decision makers	xxx				
Write a report of a simple transport planning study	xxx				

On examination

- Students who, with unauthorized aids or otherwise attempt to mislead the exam or when a student's performance is otherwise to be assessed, may lead to disciplinary action.

On instructions wrt examination

The student must access and follow given instructions regarding examination, or be subject to disciplinary actions, either warning or suspension when not following such instructions.

Studenten är skyldig att ta del av och följa givna instruktioner om vad som gäller vid examinationen. Det kan leda till disciplinära påföljder i form av varning eller avstängning om studenten inte följer instruktionerna.

On plagiarism

Plagiarism is defined as “submitting someone else’s work as one’s own”. The activities listed below are to be regarded as examples and not as a comprehensive description of what can be defined as plagiarism.

- Copying of text, problem solutions, computer programs, drawings/diagrams and pictures without citing the copied material and without specifying the source. Copying other students’ work without acknowledgment is also defined as plagiarism.
- Using ideas, data or other material without specifying the source, for example, if a student reads about someone’s discoveries and insights and uses these without specifying the name of the book (publication) or the same of the author of the source. The exception from this rule is what can be regarded as general knowledge in the field in question.
- Summarising or rewriting a text without the writer essentially changing the original. If the source material is rewritten in the student’s own words, the student’s text must include indications of the original source. The only exception is if the newly written text contains general knowledge in the field in question; however, even in this case, citation and source referencing may be useful as a way of increasing the student’s credibility as a writer.
- Too close cooperation with other students in a piece of work that is meant to be the student’s own work, i.e., the student uses another student’s discoveries and insights in his/her work without specifying this.
- Translating a piece of work without stating the original source.

How to avoid cheating and plagiarism

- See

https://www.kth.se/en/student/stodkontakt/stod/fusk-1.997287

Support

- If you have any questions, please send them to me, or Fathmeh Naqavi, or Giancarlo Herring-Calvo

  - email qianw@kth.se

    naqavi@kth.se

    ghc@kth.se

- Addtional office hours will be later provided for questions.
- Pay attention to annoucements in canvas. Answers to general questions or clarifications might be put out.

Tips!

Project

- Start early (first lab today)
- Do LAB 1 asap (now and next week)
- Start project when you have finished LAB1
- Write a concise and precise individual report
- … and be able to answer questions on the report and code

Tips!

Written Exam

Do LAB 2 and LAB 3 (learning activitites targeted towards written exam)

- Understand the content of the four questions/categories, and identify learning activities for each
- Do the example (previous) exams
- Follow the Lectures and exercises on previous exam/Final lecture