Welcome

Probability and Statistical Inference

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The Module

What is the module about?

- Data Analysis:
  - the gathering, display, and summary of data.
- Probability:
  - the laws of chance.
- Statistical Inference:
  - drawing statistical conclusions from specific data by knowing about probabilities.

What does that mean?

- How to collect and prepare data for use?
- How to describe the data (in terms of format and statistically)?
- How to formulate, state, test and report on hypotheses?
- How to conduct exploratory and predictive analytics?
- How to use an approprate software package?
  - We will be using R.
- How to report your findings correctly?

How to succeed in the module?

- Work steadily through the material:
  - Keep up.
  - Make use of the time allocated to work on problems and CA.
- Make your own notes:
  - On the topics we cover in class.
  - On how to code.
    - Make comments in your scripts and save it so that you will find it again.
- Don't be afraid to ask questions:
  - ask me, ask each other, ask the Web ...
- Keep going ...

How to succeed in the module?

- Focus on learning the process of conducting statistical analysis:
  - What are you trying to discover or show?
    - Figure out a question you are trying to answer or theory you are trying to test.
  - What data do you need to collect?
  - Once you have data, how do you describe the data you have?
    - You need to explain this to whoever will be the consumer of your work.
  - What analysis should you conduct?
    - You need to know how to interpret the outcomes of the analysis and present these to your consumer.
  - How will you present your findings?

At the end of the module, you should be able to ...

- Present the question you are interested in.
  - In a way that makes sense to conduct statistical analysis.
- Inspect and prepare the data you have.
  - To support statistical analysis.
- Describe the data you have.
  - In a way that your consumer can understand any constraints the data may put on your analysis.
- Conduct a statistical analysis.
  - Using appropriate statistical tests.
- Report on your statistical analysis.
  - In a way that makes sense for your consumer.
- Interpret the outcomes of your statistical analysis.
  - Drawing appropriate conclusions.
- Report on the findings of your statistical analysis.
  - In a way that makes sense to your consumer.

General Information

Module Info

- Class material:
  - Available via Brightspace: `brightspace.tudublin.ie`
  - Help with Brightspace and how to enrol: `dit.ie/brightspace/faqs/`
- Module Description:
  - The module aims to introduce the student to probability theory and basic methods of statistical inference, why they are needed and how they are used in constructing a data analysis. The aim will be achieved through a mixture of theory and practice.
  - Module ID: MATH 9102 Prob. & Statistical Inference
  - You dont't need a code to register.

General Updates

- Changes will be announced:
  - Via Brightspace announcements.
  - Through email from Brightspace (to your TU Dublin mail accounts).

Module Material

- Lecture notes and lab exercises:
  - Will be available in advance of classes.
  - Please note:
    - Lecture notes are intended to be a **supplement** to attending lectures **not a replacement**.
- Lab solutions will be published after the classes are completed.

Assessment

- Will be made available via Brightspace.
- **Must be** submitted via Brightspace.
- Grades consist of:
  - 40% Project
  - 60% Continuous Assessment (4 tasks)
  - You will get a mark for each, plus combined overall result.

Classes

- Thursdays 18:30 - 21:30
- Brightspace: Select Module - Module Tools - Virtual Classroom
- Mixture of lecture and lab.

Coding

- R: `https://www.r-project.org`
- R Studio: `https://www.rstudio.com`
- Shiny R: `https://shiny.rstudio.com`

Books

- Discovering Statistics Using R - Field, Miles & Field: `https://studysites.uk.sagepub.com/dsur/study/default.htm`
- Introduction to Statistics and Data Analysis - Peck, Olsen & Devore.
- An Adventure in Statistics - Field.

What's your coding experience so far?

A. Never coded before or just a little but it's not worth mentioning.

B. Some coding experience but no R or just a little R, but would need refreshing.

C. Quite a bit of coding experience and quite comfortable with using R.

D. Experienced coder and either good at R or will sure have no trouble learning it on the fly.