EC349-15 Data Science for Economists

26/27

Department
Economics
Level
Undergraduate Level 3
Module leader
Jo Turrall
Credit value
15
Module duration
10 weeks
Assessment
Multiple
Study location
University of Warwick main campus, Coventry

Description

Introductory description

This introductory data science module will introduce core economics students to a wide array of data sources and types and how to work with them. It is intended to provide students with foundation data science skills, working in R.

Module aims

The module will introduce students to the meaning of data science, working practically with data in R. Students will learn how to source, manipulate and analyse large data flows, extract knowledge and insights from large, noisy data, and understand how to use these data types to answer certain economics questions. Students will learn to apply data science theorems and algorithms to solve problems using the most suitable software and statistical tools for data processing.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

Topics typically could include, but are not limited to:

1. Introduction: Defining data science, what data scientists do, the data they use, and the limitations of data science.
2. The data science methodology (E.g., CRISM-DM, TDSP, Domino, etc.)
3. Data sources and types – rectangular vs non-rectangular data (e.g., Textual data, multimedia data, spatial-temporal data, click stream data, etc.).
4. Working with data in R
5. Data extraction and acquisition
6. Getting data into shape (mining, wrangling and manipulation)
7. Statistical methods with big data
8. Data visualisation and analysis
9. AI Applications in Data Science (E.g., Supervised Machine learning, Unsupervised Machine Learning, Deep learning, etc.).
10. Data science tools: (E.g., Working with Git, RStudio, Tidyverse, etc.)
11. Data science application in economic analysis – Literature evidence.

Learning outcomes

By the end of the module, students should be able to:

- .....understand and apply a range of supervised machine learning techniques—such as LASSO, random forests, boosting, and feedforward neural networks—and use causal inference methods to analyse economic questions. Students will also be able to implement these methods in practice by preparing data, building models, and conducting causal analysis using statistical software such as R or Python.

Indicative reading list

Reading lists can be found in Talis

Research element

Apply programming and data analysis skills to define and analyse economic and policy problems, formulate concepts and hypotheses, and show how they are tested in the policy context.

Interdisciplinary

The specific data science skills developed can also be extended beyond the economics discipline. Particularly, this module draws heavily from the field of programming and information technology, and interacts with the socioeconomic and political aspects of evaluating policy and practice.

Subject specific skills

Applied Economics
Economic information
Research and debate
Analytical reasoning

Analytical thinking and communication
Creative thinking
Critical thinking
Policy evaluation
Strategic thinking

Transferable skills

Data-based skills
IT skills
Numeracy and quantitative skills
Research skills
Information technology
Math, Statistical, data-based research skills
Written communication
Coding Skills (Python)

Study

Study time

Type	Required
Lectures	10 sessions of 2 hours (13%)
Seminars	4 sessions of 1 hour (3%)
Demonstrations	1 session of 1 hour (1%)
Private study	125 hours (83%)
Total	150 hours

Private study description

Individual study will be required in order to prepare for seminars (which will be practical labs), review lecture notes, prepare for forthcoming assessments and examinations, and to undertake wider reading around the subject.

Costs

No further costs have been identified for this module.

Assessment

You do not need to pass all assessment components to pass the module.

Assessment group D3

	Weighting	Study time	Eligible for self-certification
Individual Project	40%		No
Final economics-related data science project report in R with reproducible findings and well explained codes to be checked for plagiarism. Word count excludes codes.			
Centrally-timetabled examination (On-campus)	60%		No
A paper which examines the module content from both theoretical and technical perspectives and ensures learning outcomes are achieved			

- Answerbook Pink (12 page)
- Students may use a calculator

Assessment group R3

	Weighting	Study time	Eligible for self-certification
Resit Exam	100%		No

- Students may use a calculator
- Answerbook Pink (12 page)

Feedback on assessment

The Department of Economics is committed to providing high quality and timely feedback to students on their assessed work, to enable them to review and continuously improve their work. We are dedicated to ensuring feedback is returned to students within 20 University working days of their assessment deadline. Feedback for assignments is returned either on a standardised assessment feedback cover sheet which gives information both by tick boxes and by free comments or via free text comments on tabula, together with the annotated assignment. Students are informed how to access their feedback, either by collecting from the Undergraduate Office or via tabula. Module leaders often provide generic feedback for the cohort outlining what was done well, less well, and what was expected on the assignment and any other common themes. This feedback also includes a cumulative distribution function with summary statistics so students can review their performance in relation to the cohort. This feedback is in addition to the individual specific feedback on assessment performance.

Past exam papers for EC349

Availability

Pre-requisites

EC203-30 Applied Econometrics OR
EC226-30 Econometrics 1

To take this module, you must have passed:

- Any of
  - EC203-30 Applied Econometrics
  - EC226-30 Econometrics 1

Courses

This module is Optional for:

- UECA-3 Undergraduate Economics 3 Year Variants
  - Year 3 of L100 Economics
  - Year 3 of L116 Economics and Industrial Organization
- UECA-4 Undergraduate Economics 4 Year Variants
  - Year 4 of L117 Economics and Industrial Organisation with Study Abroad
  - Year 4 of L103 Economics with Study Abroad
- UECA-LM1D Undergraduate Economics, Politics and International Studies
  - Year 3 of LM1D Economics, Politics and International Studies
  - Year 4 of LM1H Economics, Politics & International Studies with Study Abroad