

ST337-15 Bayesian Forecasting and Intervention

22/23

Department

Statistics

Level

Undergraduate Level 3

Module leader

Marta Catalano

Credit value

15

Module duration

10 weeks

Assessment

Multiple

Study location

University of Warwick main campus, Coventry

Description

Introductory description

This module runs in Term 2 and is available for students on a course where it is a listed option and as an Unusual Option to students who have completed the prerequisite modules.

Pre-requisites:

Statistics Students: ST218 Mathematical Statistics A AND ST219 Mathematical Statistics B

Non-Statistics Students: ST220 Introduction to Mathematical Statistics

[Module web page](#)

Module aims

This course is concerned with the theory and practice of short-term forecasting, using both data and subjective information. The course focuses on Dynamic Linear Models (DLM). DLM's are a class of Bayesian Forecasting Models which generalise linear regression models and static statistical linear models. Some extensions to nonlinear dynamic models are also considered. Forecasting is a vital prerequisite to decision making. This course offers a very powerful fundamental probabilistic approach to forecasting, controlling and learning about uncertain commercial, financial, economic, production, environmental and medical dynamic systems. The

theory will be illustrated by real examples from industry, marketing, finance, government, agriculture etc.

A familiarity with the material in this module will be very useful to all students planning a career involving a component of industrial, business or government statistics.

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.

- State space modelling
- Bayesian updating of beliefs
- Specifying Dynamic Linear Models
- Updating Dynamic Linear Models, forecasting
- Building Dynamic Linear Models, accommodating external information
- ARIMA models, stationarity

Learning outcomes

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

- Acquire an appreciation of forecasting recurrences and be able to calculate these for special cases.
- Know how to select an appropriate model in simple scenarios.
- Have an acquaintance with the most useful models in the class of DLMs for statistical forecasting in a business environment.
- Know how to intervene in these processes in the light of external information.
- Have an appreciation of diagnostic methods and estimation techniques for this model class.

Indicative reading list

[View reading list on Talis Aspire](#)

Subject specific skills

TBC

Transferable skills

TBC

Study

Study time

Type	Required	Optional
Lectures	30 sessions of 1 hour (20%)	2 sessions of 1 hour
Private study	120 hours (80%)	
Total	150 hours	

Private study description

Weekly revision of lecture notes and materials, wider reading, practice exercises and preparing for examination.

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Students can register for this module without taking any assessment.

Assessment group B3

	Weighting	Study time
In-person Examination	100%	

The examination paper will contain four questions, of which the best marks of THREE questions will be used to calculate your grade.

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

Assessment group R2

	Weighting	Study time
In-person Examination - Resit	100%	

The examination paper will contain four questions, of which the best marks of THREE questions will be used to calculate your grade.

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

Feedback on assessment

Solutions and cohort level feedback will be provided for the examination.

[Past exam papers for ST337](#)

Availability

Anti-requisite modules

If you take this module, you cannot also take:

- ST405-15 Bayesian Forecasting and Intervention with Advanced Topics

Courses

This module is Optional for:

- Year 3 of UCSA-G4G1 Undergraduate Discrete Mathematics
- Year 3 of UCSA-G4G3 Undergraduate Discrete Mathematics
- Year 4 of UCSA-G4G4 Undergraduate Discrete Mathematics (with Intercalated Year)
- Year 4 of UCSA-G4G2 Undergraduate Discrete Mathematics with Intercalated Year
- USTA-G300 Undergraduate Master of Mathematics, Operational Research, Statistics and Economics
 - Year 3 of G300 Mathematics, Operational Research, Statistics and Economics
 - Year 4 of G300 Mathematics, Operational Research, Statistics and Economics

This module is Option list A for:

- Year 4 of USTA-G300 Undergraduate Master of Mathematics, Operational Research, Statistics and Economics
- Year 5 of USTA-G301 Undergraduate Master of Mathematics, Operational Research, Statistics and Economics (with Intercalated Year)
- USTA-G1G3 Undergraduate Mathematics and Statistics (BSc MMathStat)
 - Year 3 of G1G3 Mathematics and Statistics (BSc MMathStat)
 - Year 4 of G1G3 Mathematics and Statistics (BSc MMathStat)
- USTA-G1G4 Undergraduate Mathematics and Statistics (BSc MMathStat) (with Intercalated Year)
 - Year 4 of G1G4 Mathematics and Statistics (BSc MMathStat) (with Intercalated Year)
 - Year 5 of G1G4 Mathematics and Statistics (BSc MMathStat) (with Intercalated Year)
- USTA-GG14 Undergraduate Mathematics and Statistics (BSc)
 - Year 3 of GG14 Mathematics and Statistics
 - Year 3 of GG14 Mathematics and Statistics
- Year 4 of USTA-GG17 Undergraduate Mathematics and Statistics (with Intercalated Year)
- USTA-Y602 Undergraduate Mathematics, Operational Research, Statistics and Economics

- Year 3 of Y602 Mathematics,Operational Research,Stats,Economics
- Year 3 of Y602 Mathematics,Operational Research,Stats,Economics
- Year 4 of USTA-Y603 Undergraduate Mathematics,Operational Research,Statistics,Economics (with Intercalated Year)

This module is Option list B for:

- USTA-G302 Undergraduate Data Science
 - Year 3 of G302 Data Science
 - Year 3 of G302 Data Science
- Year 3 of USTA-G304 Undergraduate Data Science (MSci)
- Year 4 of USTA-G303 Undergraduate Data Science (with Intercalated Year)
- UMAA-G105 Undergraduate Master of Mathematics (with Intercalated Year)
 - Year 4 of G105 Mathematics (MMath) with Intercalated Year
 - Year 5 of G105 Mathematics (MMath) with Intercalated Year
- Year 3 of USTA-G300 Undergraduate Master of Mathematics,Operational Research,Statistics and Economics
- USTA-G301 Undergraduate Master of Mathematics,Operational Research,Statistics and Economics (with Intercalated
 - Year 3 of G30E Master of Maths, Op.Res, Stats & Economics (Actuarial and Financial Mathematics Stream) Int
 - Year 4 of G30E Master of Maths, Op.Res, Stats & Economics (Actuarial and Financial Mathematics Stream) Int
- UMAA-G100 Undergraduate Mathematics (BSc)
 - Year 3 of G100 Mathematics
 - Year 3 of G100 Mathematics
 - Year 3 of G100 Mathematics
- UMAA-G103 Undergraduate Mathematics (MMath)
 - Year 3 of G100 Mathematics
 - Year 3 of G103 Mathematics (MMath)
 - Year 3 of G103 Mathematics (MMath)
 - Year 4 of G103 Mathematics (MMath)
 - Year 4 of G103 Mathematics (MMath)
- UMAA-G106 Undergraduate Mathematics (MMath) with Study in Europe
 - Year 3 of G106 Mathematics (MMath) with Study in Europe
 - Year 4 of G106 Mathematics (MMath) with Study in Europe
- Year 4 of UMAA-G101 Undergraduate Mathematics with Intercalated Year

This module is Option list F for:

- Year 3 of USTA-G300 Undergraduate Master of Mathematics,Operational Research,Statistics and Economics
- USTA-G301 Undergraduate Master of Mathematics,Operational Research,Statistics and Economics (with Intercalated
 - Year 3 of G30H Master of Maths, Op.Res, Stats & Economics (Statistics with Mathematics Stream)
 - Year 4 of G30H Master of Maths, Op.Res, Stats & Economics (Statistics with

Mathematics Stream)