ETC3550/ETC5550
Applied forecasting

Contact details

Lecturer: Professor Rob Hyndman

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Tutors

- **Mitchell O'Hara-Wild**
- Elena Sanina
- Xiaoqian Wang
- Yangzhouran (Fin) Yang
- Zhixiang (Elvis) Yang

Brief bio

- Professor of Statistics, Monash University
- Co-author of most popular forecasting textbook in the world
- Developer of most popular forecasting software in the world

How my forecasting methodology is used:

- Pharmaceutical Benefits Scheme
- Electricity demand
- Australian tourism demand
- Ageing population
- COVID-19 cases
- TAC large claims

Unit objectives

1. To obtain an understanding of common statistical methods used in business and economic forecasting.
2. To develop the computer skills required to forecast business and economic time series data;
3. To gain insights into the problems of implementing and operating large scale forecasting systems for use in business.

Teaching and learning approach

- Recorded lectures embedded in the textbook at OTexts.com/fpp3
- No scheduled activities on Monday (other than week 1)
- One 50 minute lecture each Wednesday for 12 weeks.
- One 80 minute tutorial each week for 12 weeks.

Classes

Lectures

Week 1: Monday 11am in-person. Wednesday 3pm online
Weeks 2–11: Wednesday 3pm online
Week 12: Wednesday 3pm in-person

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- All lectures will be recorded and posted on Moodle
- One tutorial will be recorded each week and posted on Moodle.

Key reference

Hyndman, R. J. & Athanasopoulos, G. (2021) *Forecasting: principles and practice*, 3rd edition

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- Free and online
- Data sets in associated R packages
- R code for examples

Outline

Week	Topic	Chapter
1	Introduction to forecasting and R	1
2	Time series graphics	2
3	Time series decomposition	3
4	The forecaster's toolbox	5
5–6	Exponential smoothing	8
7–9	Forecasting with ARIMA models	9
10–11	Multiple regression and forecasting	7
11–12	Dynamic regression	10

Assessment

- Four assignments and one larger project: 40%
- Exam (2 hours): 60%.

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Task	Due Date	Value
Assignment 1	Sun 12 March	2%
Assignment 2	Sun 26 March	6%
Assignment 3	Sun 16 April	6%
Assignment 4	Sun 30 April	6%
Project	Sun 21 May	20%
Final exam	Official exam period	60%

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- Need at least 45% for exam, and 50% for total.
- **ETC5550 students:** Extra exam question.

Moodle site

- Includes all course materials
- Assignment submissions
- Forum for asking questions, etc.

Please don't send emails. Use the forum.

International Institute of Forecasters
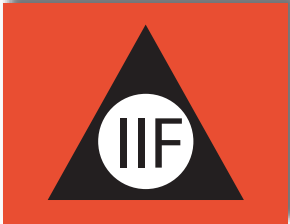
- The IIF provides a prize to the top student in this subject each year.
- US$100 plus one year membership.

Available for download from CRAN:

https://cran.r-project.org

Available for download from RStudio:

https://www.rstudio.com/products/rstudio/download/

Main packages

```r
# Install required packages (do once)
install.packages(c("tidyverse", "fpp3"))
```

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install.packages(c("tidyverse", "fpp3"))

# At the start of each session
library(fpp3)
```

Exercises Week 1

- Make sure you are familiar with R, RStudio and the tidyverse packages.
- Do first five chapters of `learnr.numbat.space`.
- Assignment 1

Assignment 1: forecast the following series

1. Google closing stock price in $USD on 20 March 2023.
2. Maximum temperature at Melbourne airport on 4 April 2023.
3. The difference in points (Collingwood minus Essendon) scored in the AFL match between Collingwood and Essendon for the Anzac Day clash. 25 April 2023.
4. The seasonally adjusted estimate of total employment for April 2023. ABS CAT 6202, to be released around mid May 2023.
5. Google closing stock price in $USD on 22 May 2023.

Due Sunday 12 March

For each of these, give a point forecast and an 80% prediction interval.

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Prize: $50 Amazon gift voucher

Assignment 1: scoring

Y = actual, F = point forecast, $[L, U]$ = prediction interval

Point forecasts:

$$\text{Absolute Error} = |Y - F|$$

- Rank results for all students in class
- Add ranks across all five items

Prediction intervals:

$$\text{Interval Score} = (U - L) + 10(L - Y)_+ + 10(Y - U)_+$$

- u_+ = max$(u, 0)$
- Rank results for all students
- Add ranks across all five items