

ETC3550/ETC5550

Applied forecasting



Contact details

Lecturer: Professor Rob Hyndman

✉ rob.hyndman@monash.edu

🏠 robjhyndman.com

🐦 [@robjhyndman](https://twitter.com/robjhyndman)

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



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