**ACE Network Subject Information Guide**

**Time Series**

**Semester 2, 2024**

**Administration and contact details**

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| **Host department** | School of Mathematical and Physical Sciences |
| **Host institution** | Macquarie University |
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**Subject details**

|  |  |
| --- | --- |
| **Handbook entry URL** | TBD |
| **Subject homepage URL** | TBD |
| **Honours student hand-out URL** | TBD |
|  |  |
| **Teaching period (start and end date):** | 22 July 2024 - 3 Nov 2024 |
| **Exam period (start and end date):** | |  | | --- | | 4 Nov 2024 - 22 Nov 2024 | |
|  |  |
| **Contact hours per week:** | 2 |
| **ACE enrolment closure date:** | TBD |
| **Lecture day(s) and time(s):** | TBD |
|  |  |
| **Description of electronic access arrangements for students (for example, LMS)** | TBD |

**Subject content**

1. **Subject content description**

In statisticians' ideal, all random elements are independent and identically distributed. However, in Time Series, the future and the past are usually not independent. To tackle and utilise this dependence, this unit introduces Time Series Analysis with an emphasis on Forecasting. Its first part gives some intuitions about the trend, seasonality and cycles of the time series and then uses these intuitions to forecast. Its second part tries to depict the dependence within time series with stochastic models, e.g., ARIMA and the state-of-the-art Neural Network, and then make forecasts based on these models.

1. **Week-by-week topic overview**

1 Introduction

2 Time series graphics

3 Time series decomposition

4 Time series features

5 The forecaster's toolbox

6 Time series regression models

7 Exponential smoothing

8 Exponential smoothing

9 ARIMA models

10 ARIMA models

11 ARIMA models

12 Dynamic Regression models

13 Neural Network

1. **Assumed prerequisite knowledge and capabilities**

Knowledge of probability distribution, expectation, conditional expectation, confidence interval, hypothesis testing and perhaps likelihood; familiarity with the R programming language.

1. **Learning outcomes and objectives**
   1. provide an understanding of common statistical methods used in forecasting
   2. develop computer skills for forecasting time series data
   3. provide insights into the problems of large scale forecasting systems
2. **Learning resources**

* Rob J Hyndman and George Athanasopoulos (2021) Forecasting: principles and practice, 3rd edition, OTexts: Melbourne, Australia.
* The online version of this book could be found at https://otexts.com/fpp3/

1. **Assessment**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Exam/assignment/classwork breakdown** | | | | | |
| **Exam** | 55% | **Assignment** | 3\*15% = 45% | **Class work** | 0 % |
|  | | | | | |
| **Assignment due dates** | | Week 4 | Week 8 | Week 12 |  |
|  | | | | | |
| **Approximate exam date** | | | | |  |  | | --- | --- | |  | 4 Nov 2024 - 22 Nov 2024 | | |

**Institution honours program details – To Be Determined**

|  |  |
| --- | --- |
| **Weight of subject in total honours assessment at host department** | Click here to enter text. |
| **Thesis/subject split at host department** | Click here to enter text. |
| **Honours grade ranges at host department** |  |
| **H1** | Enter range % |
| **H2a** | Enter range % |
| **H2b** | Enter range % |
| **H3** | Enter range % |

**Institution masters program details – To Be Determined**

|  |  |
| --- | --- |
| **Weight of subject in total masters assessment at host department** | Click here to enter text. |
| **Thesis/subject split at host department** | Click here to enter text. |
| **Masters grade ranges at host department** |  |
| **H1** | Enter range % |
| **H2a** | Enter range % |
| **H2b** | Enter range % |
| **H3** | Enter range % |