



**ACCT420**  
**Forecasting and Forensic Analytics**  
 AY 2024/2025 Term 2  
 (Jan-Apr 2025)

**Instructor and Contact Information**

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**Teaching Assistant**

TBC

**Course Prerequisites**

ACCT337 Statistical Programming (formerly ACCT419) / DSA211 Statistical Learning with R, or equivalent knowledge in R programming and statistics.

**Course Description**

This course explores how data can be used to solve accounting problems across financial accounting, managerial accounting, and audit contexts. Students will gain exposure to techniques to explore how financial and non-financial data is used to forecast events, detect financial discrepancies and frauds, predict corporate default, optimize operations, and determine business strategy. The emphasis of this class will be on problem solving, theory, and application, with additional emphasis on interpretation and communication. Some programming will be required, but programming help will be provided at the start of the semester via online tutorial and through instructor-provided code. Some advanced analytics methods such as text analytics, neural networks and deep learning will also be introduced. This course has been designed to equip students with an analytics mindset to develop analytics strategies and make better business decisions.

**At a glance:**

- Class sessions will consist of theory, class discussion, problem solving, and some group work
- Computer usage is encouraged, given the nature of the subject
- All important announcements will be made through Telegram and in class (time permitting)
- Assessment: 10% participation, 20% DataCamp assignments, 20% Individual R Assignment, 40% group project, 10% individual project task (**No Final Exam**)
- *Readings:*
  - Textbook: None. But a good reference is *R for Everyone* by Jared Lander
  - Selected excerpts from other texts in class.
- *Other resources:*
  - Students are required to install R on their laptops.
    - R is a free statistical language widely used by data science professionals
  - Students are recommended to install RStudio on their laptops, a free R interface
  - Access to financial databases and other data through SMU Library



## **Learning Goals, Course Objectives, and Skill Development**

This course contributes to the development of the following learning goals and objectives of the School's Bachelor of Accountancy program:

Learning Goal 1 (Accounting Competencies):

*LO1.1:* Our students can recognize, develop, measure, record, validate and communicate financial and other related information.

*LO1.2:* Our students can analyse, synthesise and evaluate financial and other related information for decision making in a management context.

Students are expected to demonstrate the following technical competencies upon successful completion of this course:

*Understand* the role of data analytics in solving accounting and business problems, such as revenue prediction, bankruptcy prediction, and fraud detection.

*Demonstrate* familiarity with statistical programming in the contexts of forecasting and forensics.

*Transform* financial and nonfinancial data into useful insights for business.

*Communicate* inferences from analysis through writing, speaking, and visuals.

*Develop* an ability to independently learn and explore new methods in analytics in this ever-changing field.

Class activities are designed to further develop students' analytical, communication, and active learning skills, as well as students' professional ethics. Students must be prepared to go beyond lecture materials and prescribed reading.

## **Texts and Other Resources**

**Online Resource:** DataCamp (link will be provided on eLearn discussion board and Telegram)

**Optional Reference Text:** *R for Everyone* by Jared Lander 2<sup>nd</sup> edition (2017)

*Additional Reference Books (previously used in ACCT337 Statistical Programming):*

*Data Mining for Business Analytics: Concepts, Techniques, and Applications in R* by Galit Shmueli, Peter C. Bruce, Inbal Yahav, Nitin R. Patel, Kenneth C. Lichtendahl Jr. (2018)\*  
\*Physical copies are available in the Library and e-copies are available at [library.smu.edu.sg](http://library.smu.edu.sg)

*An Introduction to Statistical Learning (with applications in R)* by Gareth James, Daniela Witten, Trevor Hastie and Robert Tibshirani (2013); available at: <http://www-bcf.usc.edu/~gareth/ISL/>

*The Art of R Programming* by Norman Matloff (2009); available at: <http://heather.cs.ucdavis.edu/~matloff/132/NSPpart.pdf>

## Assessment

To pass this course, a student is required to obtain a **total** mark of 50% or better. The assessment components for this course are as follows:

Class Participation	10%
DataCamp Assignments	20%
R In-Class Assignment	20%
Group Project and Presentation	40%
Project Task (Individual)	10%
<b>Total</b>	<b>100%</b>

- I. Class Participation (10%): a continuous assessment throughout the term where students are involved with interactive in-class discussions.

3 components:

1. Attendance (3%)
2. Self-Reflection Journal on Instagram (4%)
3. In-class discussions and participation (3%)

- II. DataCamp Assignments (20%): 5 assigned DataCamp\* courses.

#	Assignment	Due by end of	Est. Time (hours)
1 <sup>^</sup>	Modelling with Data in the tidyverse	Week 3	4
2	Introduction to Regression in R	Week 5	4
3	Credit Risk Modelling in R	Week 7	4
4 <sup>^</sup>	Modelling with tidymodels in R	Week 9	4
5	Introduction to Text Analysis in R	Week 11	4

\*Note: DataCamp courses sometimes includes additional code and functions beyond course material. The other assessment components will only assess you on R code, techniques, and theories covered **in-class**. The purpose of these DataCamp assignments is to give you a broader exposure to R syntax and how it can be used for statistical learning and machine learning. Feel free to use what you have learnt in DataCamp in your Group Project.

<sup>^</sup>Available only on Desktop

You will be graded on completion **AND** subsequently **ranked** based on XP points earned on DataCamp. Your grade for this component will be determined by your **ranking**.

- III. R In-Class Assignment (20%): R coding assignment done in class in **Week 12**
- IV. Group Project and Presentation (40% in total): Details TBC.

The projects will be evaluated on 3 main categories:

- R Code (10%) – Codes that are used to generate the analyses
- Report (10%) – Report that consists of a technical section explaining the logic behind the implementation the R codes and a writing section detailing the business analysis
- Group Presentation (20%) – Delivered in Week 13

- V. Individual Project Task (10%): Details TBC

## Lesson Plan

The course is conducted over 13 weeks with a 3-hour lesson each week, except for Week 8. The following is the **tentative lesson plan** and is **subject to change** as the **course is undergoing revision**. All relevant course materials, including the project, will be published on SMU eLearn (<https://elearn.smu.edu.sg/>) and will be announced on Telegram.

Week	Topic(s)
1	<b>Forecasting and Forensic Analytics Learning Roadmap</b> <b>+ Client Introduction</b>
2	<b>Revisiting Linear Regression</b> Beyond OLS: Other linear models, Panel data, Noise <b>Forecasting Analytics using Advanced Linear Regression</b> Factoring time effects into data: lag, cyclical, seasonality
3	<b>Pre-Recorded Seminar (No class due to Chinese New Year Day 1)</b> <b>Logistic Regression Theory and Applications in Corporate Default + Accounting Fraud</b>
4-6	<b>Accounting Manipulation</b> <b>Logistic Regression Models in R</b> Altman-Z and Merton's DD for Corporate Default and Credit Downgrades Predicting Accounting Misstatements Accounting and Auditing Enforcement Releases (AAERs) LASSO and XGBoost
7	<b>Project Progress Q&amp;As Discussion with Client</b> <b>+ SMU Research Librarian Session on using data from WRDS</b>
8	Mid-Term Break
9-10	<b>Text Mining for Forecasting and Forensic Analytics + Topic Modelling</b>
11	<b>Project Consultations</b> (Review of Predictive models)
12	<b>In-Class R Assignment</b>   Course Summary
13	Group Project Presentations

### Software

*Refer to Appendix for details*

Students are expected to have RStudio and its necessary plugins installed before the first lab session. R Packages can be loaded from the library during the lab sessions. The R version that RStudio requires to run **must be 4.0.2 or newer**. If you are running an older version, please download an up-to-date version from [www.r-project.org](http://www.r-project.org).

### **Academic Integrity**

All acts of academic dishonesty (including, but not limited to, plagiarism, cheating, fabrication, facilitation of acts of academic dishonesty by others, unauthorized possession of exam questions, or tampering with the academic work of other students) are serious offences.

All work (whether oral or written) submitted for purposes of assessment must be the student's own work. Penalties for violation of the policy range from zero marks for the component assessment to expulsion, depending on the nature of the offense.

When in doubt, students should consult the instructors of the course. Details on the SMU Code of Academic Integrity may be accessed at:

<https://smu.sharepoint.com/sites/oasis/SitePages/DOS-WKLSWC/UCSC.aspx>.

### **Copyright Notice**

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### **Accessibility**

SMU strives to make learning experiences accessible for all. If you anticipate or experience physical or academic barriers due to disability, please let me know immediately. You are also welcome to contact the university's student accessibility support team if you have questions or concerns about academic provisions: [accessibility@smu.edu.sg](mailto:accessibility@smu.edu.sg). Please be aware that the accessible tables in our seminar room should remain available for students who require them.

### **Digital Readiness for Teaching and Learning (DRTL)**

As part of emergency preparedness, instructors may conduct lessons online via the Zoom platform during the term, to prepare students for online learning. During an actual emergency, students will be notified to access the Zoom platform for their online lessons. The class schedule will mirror the current face-to-face class timetable unless otherwise stated.

Vetted by: Seow Poh Sun, 11 October 2024