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Actuarial
Students'
Society

SUBJECT REVIEW

2021 EDITION

Contents

Actuarial Students' Society
The University of Melbourne

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Preface

By now, you have probably ascertained that you may want to be an actuary. But what must one learn to become an actuary? A quick Google search for "actuarial science" will bring up this Wikipedia definition:

> Actuarial science is the discipline that applies mathematical and statistical methods to assess risk in insurance, finance and other industries and professions.

Perhaps this suggests a predominant study of mathematics, statistics, and finance. Nevertheless, this gives no headway as to what exactly an Actuarial student may encounter in their university studies. As it turns out, the path to becoming an actuary is arduously complex, and the Actuarial Students' Society has recognised this.

This publication is the product of the society's efforts to create greater transparency regarding the subjects studied as part of an *Actuarial Studies* major under the *Bachelor of Commerce* degree. Through this, we hope that students hoping to graduate from the major may gain, not only greater insight into the content studied in these subjects, but also general tips and advice that past students have provided based on their own experience. With authors coming from a range of different backgrounds, we hope to highlight the obstacles and challenges in each subject so that students may prepare themselves better for their studies.

Invariably, each review will be an expression of opinion — we urge readers to be conscious of this fact, as the subject experience may differ from individual to individual. Please take note of the year and semester of each subject review. Subject content, structure, and personnel undergo continuous change, and it is important to recognise whether the reviewed curriculum has since been superseded. Such reviews will, however, still serve as a reliable reference for the general direction of the subject.

If you are interested in submitting a subject review for the next edition of this guide, please contact the Actuarial Students' Society at contact@melbourneactuary.com.

Important Information on the 2021 Subject Review

Subject Reviews from Previous Editions

To provide the most value to our members, we have included reviews from previous editions of the *ASS Subject Review* for subjects not completed by any of our contributors in 2021. Each individual review specifies the year and semester in which the subject was completed.

Even though the curriculum, assessments, and/or other aspects of certain subjects may have changed since the original publication of their respective reviews, we still hope that these reviews will provide valuable guidance and insight to students who are enrolled in or considering enrolling in these subjcts.

Inclusion of breadth and elective subjects

The change in the accreditation curriculum also meant that full-major Actuarial students seeking postgraduate study are only allowed one breadth/elective subject (if the student chooses not to take ACTL10001) and two non-math breadth subjects. With this in mind, the *Actuarial Students' Society Subject Review* will continue to include a range of breadths and electives available to our members. The inclusion of these reviews will assist all Actuarial students in deciding the right breadth or elective for them; whether they wanted a subject to broaden their study options, to learn concepts to complement their developing actuarial skillset or to have a "bludge" subject.

Finally, the *Actuarial Students' Society Subject Review* has always been a publication by Actuarial students for Actuarial students. Whilst the majority of our members have been pure Actuarial majors, a significant portion of our membership and committee alike undertake the Actuarial major with another. Therefore, we have expanded the 2021 edition of the *Actuarial Students' Society Subject Review* to include subjects relevant in obtaining double majors with Actuarial and the Economics or Finance majors — written by students taking double majors themselves. Ultimately, their experiences can relate to many other first or second year Actuarial students standing at this crossroad; we hope that these reviews will help facilitate the making of this decision.

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About the Actuarial Students' Society

Founded in 1989, the Actuarial Students' Society has established itself as the University of Melbourne's official society for students undertaking actuarial studies, with the support of the University of Melbourne Centre for Actuarial Studies. Our aim at the society is to expand our members' career opportunities by bridging relationships between students and professionals alike, and by developing their actuarial skill sets.

By connecting our student members with like-minded peers, experienced lecturers and sponsorship representatives, we enable our members to get head starts in their actuarial careers. To achieve this, our society holds multifarious events, both social and professional. The Actuarial Students' Society's social calendar includes events like Trivia Night and Poker Night; they emulate a warm and amicable atmosphere that encourages students to mingle with other students and ask sponsors meaningful questions. Our professional calendar includes events like our flagship Contact Night, where students can network with and learn from working actuaries in a more formal setting.

The Actuarial Students' Society's didactic workshops in Excel and R equip our members with fundamental skills for the profession and the fiercest tools for job-seeking. Employers have favoured candidates who are proficient in such areas; we take pride in helping our members take real strides in their career development early on. Through the coalescence of constant exposure to the actuarial world, our members will learn to love the actuarial degree and profession. Your first step starts with us—the Actuarial Students' Society.

For more information, including how to become a member, please visit our website or Facebook page:

www.melbourneactuary.com

www.facebook.com/actuarialstudentssociety

Subject Reviews

Acknowledgements

The Actuarial Students' Society would like to extend its sincere gratitude to the following people for their kind contributions to the 2021 edition of the *Actuarial Students' Society Subject Review*.

Disclaimers

All opinions and observations expressed herein remain the views of the individual author and do not necessarily reflect the views of the Actuarial Students' Society or the University of Melbourne.

Whilst the Actuarial Students' Society has made every effort to ensure the reliability and validity of any information presented herein, the Actuarial Students' Society does not guarantee accuracy, relevance, or completeness of any information provided. The Actuarial Students' Society and the University of Melbourne do not assume legal responsibility for any decisions made or actions taken as a result of information available in this guide.

The impact of COVID-19 on the *Actuarial Students' Society Subject Review*

In light of the persisting COVID-19 situation, the Actuarial Students' Society have endeavoured to bring value to our members throughout 2021 with our adapted workshops, information sessions and the *Actuarial Students' Society Subject Review*.

Please note that all the subjects reviewed in 2021 reflect the individual author's educational experiences in an online environment. Whilst the authors have kept this in mind as they composed their reviews, undoubtedly the aspects of some reviews — including assessment details and specific advice given — hold only for the online delivery of these subjects. We hope that the 2021 edition of the *Actuarial Students' Society Subject Review* can continue to provide valuable information for our members hereafter.

First-Year Subjects

Contents

ACCT10001 Accounting Reports and Analysis [SM1]

Exemption status	Not an exemption subject, but it is a prerequisite for ACCT10002 *Introductory Financial Accounting* (CB1 *Business Finance*).
Lecturer(s)	Mr Noel Boys
Weekly contact hours	1 × 1.5-hour lecture 1 × 1.5-hour tutorial
Assessments	Tutorial participation and preparation 6% Assessable tests 1 × 4% = 4% Individual assignments 2 × 10% = 20% 3-hour end-of-semester exam (hurdle) 70%
Textbook recommendation	Birt, J, Chalmers, K, Maloney, S, Brooks, A, Oliver, J & Bond, D 2020, *Accounting: Business Reporting for Decision Making*, 7th edn, Wiley, Australia ✓ Recommended. Noel's lectures were very comprehensive, the textbook explained certain concepts While in more detail and had an abundance of practice questions for each topic.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2021 Semester 1

Contents

Despite its content-heavy nature, I found ARA to be a highly practical and applicable subject that provides great insight into the vital role that accounting plays in any organisation. It covers in detail the components and purposes of different financial statements, as well as techniques used by management to ensure an organisation's functionality.

As someone who was new to Accounting, I felt the content was taught in a very logical structure and at a reasonable pace, even though the amount of memorisation required made the subject quite dry at times. The content was not difficult to understand, however it certainly took some time for me to form a solid idea of how different pieces of information combine to form the accounting system.

Subject content

The course is split into two. The first section consists of topics 1–6 exploring 'financial accounting', which is the preparation of reports. The second section covers topics 7–10 which discusses 'management accounting', how various information can inform decision making about the business and investors.

1. **Regulatory and Conceptual Framework**:
   - Explores the nature and purpose of accounting, introduces the different users of accounting information, different types of organisation structures, elements of financial statements, and accounting policies.
2. **Transaction Analysis and Financial Statements**:
   - Introduces the accounting equation which underpins the Statement of Financial Position and the Statement of Profit/Loss, both of which are explained in this topic.
3. **Assets**:
   - This topic covers all the different types of short-term and long-term assets usually owned by an organisation as well as their measurement and recognition criteria.
4. **Liabilities and Equity**:
   - This second part of the balance sheet preparation introduces the liability and equity classes and their respective measurement issues. It also investigates business financing and the weighted average cost of capital.
5. **Income and Expenses**:
   - This topic presents the profit and loss statement and investigates measurements in its preparation.

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6. **Statement of Cash Flows**:
   • The last of the general-purpose financial reports is introduced in this topic. Boys also covers earnings management techniques which are used to manipulate financial reports.
7. **Financial Statement Analysis**:
   • This begins the second half of the course investigating the management accounting aspects of accounting. Trends and ratios are calculated, and their relationships investigated.
8. **Budgeting**:
   • Instead of looking into the past, this section tries to predict the future earnings and position of the business. The different styles of budgeting are also examined.
9. **Cost-Volume-Profit Analysis**:
   • Another management accounting technique, this type of analysis is the most mathematical part of the course, with much emphasis put on interpreting the results you calculate.
10. **Sustainability in Accounting**
   • This topic is held by a guest lecturer. It examines the emerging area of sustainability accounting and introduces theories to explain business' actions. There will likely be a question on the exam in this vein.

Lectures

While I did not personally find ARA to be the most interesting subject, Mr. Noel Boys was certainly one of the most entertaining educators I have ever met. His well-placed humour made the 1.5-hour recorded lectures very bearable, and many of his jokes were directly related to the content taught, making it easier and more enjoyable to digest.

The lecture slides had clear explanations and were already quite condensed, so I found little marginal benefit in making notes for most topics. However, some people may find it useful to paraphrase certain explanations/terms in their own words; it is entirely up to the individual.

Tutorials

Each week's 1.5-hr online tutorial focused on the topic covered in the previous week's lecture. In contrast to the theory-focused lectures, the tutorial activities were predominantly application-based. These activities were especially helpful in giving a better grasp of certain small details in each topic.

Assessments

TUTORIALS

The 6% from tutorial participation and preparation are very leniently given, so make sure to attempt every preparation quiz and attend every tutorial if possible. The preparation quizzes are a very elementary representation of the material, so make sure to not underestimate the subject based on that. The assessable quizzes (each worth 1%) are good representations of the style and difficulty of the multiple-choice questions in the final exam.

ASSIGNMENTS

The individual assignment was given out very early in the semester, and involved the preparation of a balance sheet and a statement of profit/loss. The group assignment focused on every aspect of financial analysis. Both were completed in Excel and both were relatively easy, but given the sheer number of entries, it is important to double-check every single number to prevent any "silly mistakes" from arising.

EXAM

This semester's exam was open-book. We had 3 hours to complete a financial report (with the balance sheet, statement of profit/loss, statement of cash flows) worth 40 marks in total and 80 multiple-choice questions worth 1 mark each. For those who are curious towards the many horror stories about ARA exams, this is mainly because the financial data provided for the report tends to be very scattered and convoluted, organised in unpredictable ways. I was quite shocked when attempting my first past exam, as it was much more difficult than any of the material covered during the semester. However, by repeatedly practicing with past exams, this notorious section becomes immensely easier, and can even turn out to be a huge mark-booster

ACCT10002 **Introductory Financial Accounting** [SM2]

Exemption status	CB1 *Business Finance*, in conjunction with FNCE10002 *Principles of Finance*. An average mark of 73 across both subjects is required.
Lecturer(s)	Mr Warren McKeown
Weekly contact hours	1 × 1.5-hour lecture 1 × 1.5-hour tutorial
Assessments	Individual written assignment 5% 3 × Online quizzes 10% Individual Xero assignment 15% 3-hour end-of-semester exam 70%
Textbook recommendation	None
Lecture capture	Full (both audio and video)
Year and semester reviewed	2021 Semester 2

Overall Comments

Contrary to Accounting Reports and Analysis which looked at accounting as a whole, Introductory Financial Accounting, or IFA, delves deeper into accounting from the perspective of a preparer of financial reports. While I personally found ARA to be easier and, frankly, more interesting, I think those who have done accounting in high school will find that the content simply builds upon what they previously learnt. Thus, this subject will probably come more easily to them than it will to others.

Subject Content

IFA focused on the effects of transactions on the General Journal, individual ledger accounts, and ultimately the financial statements. Many concepts were familiar from ARA, this time extended with further details. The topics covered in each week are:

1. Introduction
2. Double Entry Accounting
3. Adjustments
4. Inventories
5. Receivables
6. Non-current Assets
7. Liabilities
8. Equity
9. Share Issues
10. Statement of Cash Flows
11. Accounting for GST

After the initial introductory content, Week 2 introduced the foundational concepts of IFA including T-accounts, debits, and credits. Familiarizing yourself with these processes is straightforward but essential, as the remainder of the subject relies

on it. The following weeks discussed the debit and credit impact of various transactions on the accounts, separated into categories. Week 10 summarizes a lot of the content of the subject in the preparation of cash flow statements, which requires a thorough grasp of the interaction between accounts as the ultimate test of your understanding — this is a heavily examined topic, but also easily studied in the provided questions. The final week of the content pertains to the GST treatment of transactions in the accounts, which can be confusing initially but manageable with practice.

Heavy emphasis was placed on definitions of words from the Accounting Standards. These must be remembered as short answer questions often relate to these definitions.

Lectures

Lectures were around 1.5 hours long though some lectures were longer/shorter than others. The lectures were released at the beginning of each week. The lectures consisted of the lecturer going through a PowerPoint presentation; sometimes there will be a supplementary video going through past exam questions. You should have a go at these questions yourself before referring to the answers to consolidate your knowledge!

Tutorials

Each week there is a 1.5 hour tutorial. While tutorial attendance isn't mandatory, the tutorials provide good revision for the previous lecture's content. Some tutors give a short recap of the lecture contents to start the lecture; following this, they speak through the answers of the tutorial worksheet (you will be assigned questions to complete before the tutorial).

Online Quizzes

There are three online quizzes scattered throughout the semester. Each quiz is 1 hour, and they consist of calculation questions, journal entries or drop down theory questions. These are mostly straightforward and should be okay to do without a copious amount of revision beforehand.

Assignment 1 (Written Assignment)

Another relatively straightforward assignment, although difficult to score highly in. In this assignment you are given a question stem and are required to provide a ~300 word response to the prompt. It is important to really tailor your answers to the rubric provided.

Assignment 2 (Xero Assignment)

Accounting practiced in real life. Students are tasked with the recording of transactions and preparation of financial reports for a small business using accounting software – Xero. The financial reports are then used to answer a set of multiple choice questions; leave ample time to interpret these questions though, for they can be somewhat mindboggling.

End-of-semester Exam

The exam was 3 hours long; it had 80 multiple choice questions (80 marks) and 4 short answer questions (40 marks). The exam was not conducted under Zoom supervision, and as such, was open book and calculator friendly. I personally think it would be wise to do the short answer questions first, in the event you are tight on time and need to guess some of the multiple choice questions.

ACTL10001 Introduction to Actuarial Studies

Exemption status	None
Lecturer(s)	Prof Benjamin Avanzi
Weekly contact hours	2 × 1-hour lectures
	1 × 1-hour tutorial
Assessments	Individual assignment 1 × 10%
	Mid-semester exam 10%
	Yellowdig participation 10%
	End-of-semester exam (Hurdle) 70%
Textbook recommendation	Dickson, D. C. M., & Atkinson, M. E. (2011). *An Introduction to Actuarial Studies (2nd ed.)*. Cheltenham, UK: Edward Elgar Publishing.
	The text is mainly used as a source of supplementary questions to the provided tutorial questions. I found this useful for further revision on tricky topics in the latter half of the subject.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2021 Semester 2

Overall Comments

Subject Content

1. **Simple Interest and Simple Discount**

   Reminiscent of the first weeks of *Principles of Finance*. This was mostly straightforward material, but it is important to pay attention to the relationship between the interest and discount rate.

2. **Compound Interest**

3. **Annuities**

4. **Bonds and Loans**

   The contents of Weeks 2–4 overlapped heavily with POF. Doing it again using actuarial notation and slightly different formulae yielded new insights for me, so definitely still pay close attention.

5. **Demographics**

   This topic introduced the features of populations through ratios and population pyramids. The analysis is simple but interesting to interpret.

6. **Life Tables**

   We covered the basic features and functions of a life table in this topic. The usage of life tables is heavy in the following topics, so it is important to become familiar with the notation and calculations involved.

7. **Mortality, Fertility and Population Projections**

   This week contained a lot of scattered content focusing on analysing populations. These were all interesting to learn about but formed little of the final examined content.

8. **Contingent Payments**

   Week 8 focuses on valuing future cashflows that are uncertain. I found this topic particularly challenging and found the textbook to provide some helpful additional practice.

9. **Life Insurance**

A quick introduction to common life insurance products and how to approach related calculations.

10. **Premiums and Reserve**
This week combined the material from Weeks 8 and 9 focusing on work in the life insurance industry. This week was full of tedious calculations where questions could get especially grotesque with changing interest and mortality rates.

11. **General Insurance**

12. **Superannuation**
The final two weeks contained no quantitative content, and the remainder of the subject simply discussed the features and products of the General Insurance and Superannuation practice areas. This content is still examinable, but much less time-consuming to cover and prepare for.

The subject begins with content resembling the financial mathematics portion of *Principles of Finance*. Since these concepts of present values, accumulations and interest rates were frequently applied in the subject, I found the first few weeks to be a good opportunity for revising these essential foundations. Actuarial notation is also introduced here, which students should familiarize themselves with as soon as possible.

The following weeks introduce interesting ideas of demographics and life tables, with heavy emphasis on probabilities of survival and mortality. Later on, this was combined with the financial mathematics from the initial weeks to calculate expected present values and insurance premiums. With my weak foundation in probability, I found this section of the course to be a bit confusing but manageable with practice.

Aside from these theoretical topics, Benjamin also gave us an insight into the actuarial industry, including discussions of professionalism and broad overviews of insurance types and superannuation. This was scattered throughout the semester in the form of interview recordings and analysis of related current events.

Lectures
Lectures were separated into chapters as covered in the textbook, and usually added up to two hours of material each week. Benjamin's lectures were well organized and structured intuitively. However, the delivery is sometimes clunky and hard to follow — especially in explaining the derivations of equations. Luckily, the detailed slides were able to somewhat make up for this, since I could pause the recording and work through the slides before continuing. Otherwise, the lecture quality was good. My favourite part of lectures were the example questions, where Benjamin made the rationale behind each solution very clear. This was very helpful in my study.

Tutorials
Attendance in tutorials were not marked this semester and the classes were held over Zoom. While I still found value in discussing in breakout rooms, the solutions provided on the LMS were easily detailed enough to study individually. The practice questions were all provided, supplemented by a collection of past exam questions and a further list of textbook questions.

In tutorials, the tutor began by recapping the lecture material the assigning us into breakout rooms to discuss the week's tutorial questions with each group being responsible for different questions. We reconvened at the end tutorial to share answers. Attending the Zoom tutorials was useful in cases where you may want to pursue further detail than what was provided in the solutions, but I rarely found this to be the case, primarily because the practice questions were all of adequate difficulty with comprehensive worked solutions. As the group assignment was made many times easier with a cohesive group, another benefit of attending the zoom tutorials this semester was to meet potential group members for the assignment.

Individual Assignment
While the individual assignment traditionally involved calculation questions that were to be done using an Excel spreadsheet, the assignment for this semester was a 5 minute recorded presentation on the analysis of general insurance premiums across two legitimate insurance companies.. Although almost everyone agrees that a question set would be

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more straightforward and less painful, this assignment certainly provided great training for one's communication and presentation skills. These qualities are invaluable in the workplace and could be the deciding factor to whether one lands their dream role or internship.

Yellowdig Participation

To encourage interaction and bonding between fellow students, 10% of the subject's final score is based on participation on a forum called Yellowdig. One can earn points by commenting on other people's threads or starting threads, etc. By the end of the last teaching week, one's score for this component is calculated based on whether they've achieved a certain number of total points. In all honesty, as long as you have 10 minutes to spare every week and do not forget about this component, it is free marks.

Mid-semester and end-of-semester exams

Compared to other subjects, I found timing to not be an issue for the 1-hour mid-semester exam and 3-hour final exam for this subject. The tutorial sheets alone provide ample revision for the calculation questions. However, the tutorial sheets barely contain any questions on general theory related to actuarial practice, despite it accounting for around half the marks in both exams. Despite it being rather tempting to overlook the worded theories that seem much drier than the mathematical techniques, it's important to include it in revision.

ECON10003 Introductory Macroeconomics [SM2]

Exemption status	Not an exemption subject, but it is a prerequisite for ECON20001 *Intermediate Macroeconomics* (CB2 *Business Economics*).
Lecturer(s)	Prof Chris Edmond
Weekly contact hours	2 × 1-hour lectures
	1 × 1-hour tutorial
Assessments	Tutorial attendance and participation 10%
	2 × Online multiple-choice tests 10%
	2 × Group assignments 20%
	3-hour end-of-semester exam 60%
Textbook recommendation	Bernanke, Olekalns, Frank, Antonovics and Heffetz, MacGraw Hill, 2019, *Principles of Macroeconomics Fifth Edition*
	This textbook is X not recommended. It was not used very often throughout the semester, it served more as an additional resource for extra readings if anything was not explained well during the lectures, however, questions could also be posed during tutorials to be clarified.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2021 Semester 2

Overall Comments

This subject was a good introduction to macroeconomics and Chris provides really good real-life applications and events like COVID subsidy programs that made this subject really engaging. This will really give you a good insight into how and why the government introduces new regulations and policies when seeing it on the news.

Subject Content

1. **Introduction to GDP**: The first week of this topic introduces economics on a global scale, looking at GDP and how it is used to measure economic activity, as well as a comparison tool between economies.
2. **Inflation and Interest Rates, Savings and Investments**: This topic makes a start by introducing the Government goals for the economy and introduces price levels and responses made by the Reserve Bank of Australia, and the effects of these changes on the components of GDP.
3. **The labour market and short-term economic fluctuations**: The content in this week's lectures was quite simple, building upon the simple supply and demand market, with the labour market. This week also introduces the different types of unemployment and methods of measuring and categorising unemployment.
4. **A Keynesian Model of the Macroeconomy**: This topic is the first topic where new content is introduced on top of high school economics. There are many concepts covered including the background of the model, and how to effectively use the model to look at current economic outcomes. This model is heavily assessed throughout the semester, so learning the Keynesian Model is vital to doing well in this subject.
5. **Fiscal policy, Financial markets and Intermediation**: This topic introduces Government policy and intervention methods to sustain the economy as changes occur. This week also introduced concepts such as stabilisers, self-correcting the economy depending on the level of output.
6. **RBA and monetary policy, aggregate demand and supply**: This topic builds further on the interest rates set by the Reserve Bank of Australia, looking at how their decisions are made and the impact of changes in the interest

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rates on the economy. This is also the week where aggregate demand and aggregate supply are consolidated, studying their components in depth.

7. **Solow-Swan Model**: The Solow-Swan Model is the second model explored in this topic and is another key component to the assessments in this subject. This model looks at the long term economic growth by considering capital accumulation, population growth, and technological advances.

8. **International trade and exchange rates**: This topic introduces international trade as well as how the exchange rate for each currency is determined, looking at the supply and demand for the currency. This topic also makes a start to looking at the trilemma, where only two of a fixed exchange rate, free capital movement, and independent monetary policy, can be employed.

9. **Balance of payments**: This is the last topic covered in this subject, which looks at the overall Government Spending and transactions on a global scale.

Lectures

There are 2 1-hour lectures every week, and Chris starts from the short-run topics while introducing snippets of long-run topics then continues to move to long-run topics in the second half of the subject. Since it's an open book exam, don't focus on memorizing it but focus on understanding it and try testing yourself about what would happen in a different setting.

Tutorials/Practicals/Workshops

There are 1 1-hour tutorial every week, and these mainly explain the concepts from the lectures. They have a 5% participation score so you shouldn't skip it, and I'd recommend you to actively participate and ask questions to get the full 5% mark. Additionally, Nahid Khan usually holds fortnightly review sessions going through past papers, and they're really helpful in understanding the content, even more helpful than the tutorial questions in my opinion.

There are also 5% weekly pre-tutorial quizzes that have 2 tries hence you shouldn't find it too difficult to ace this as well.

Assignments

The assignments were in groups of 3, and they involved real-life online researching of data for different countries from different years. This was personally more interesting than the usual content-related assignments and gives you a good insight of how the contents taught in the lectures actually relate to real-life events.

The online quizzes were only 30-minutes MCQ questions and were just a little more difficult than the pre-tutorial quizzes.

End-of-semester Exam

There were two parts: the first was in MCQ format while the second was in short-answer True/False format. The MCQ was quite tricky but has similar difficulty to the online quizzes. The short-answer was more difficult since it required you to give a True/False answer while the questions usually seemed in the grey, but what matters most is your explanations. However, don't forget to watch the review sessions since about 20% of the questions are similar to those in the review sessions!

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ECON10004 Introductory Microeconomics [SM1]

Exemption status	CB2 *Business Economics*, in conjunction with ECON20001 *Intermediate Macroeconomics*. An average mark of 73 across both subjects is required.
Lecturer(s)	Prof Tom Wilkening Mr Jonathon Thong
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour tutorial
Assessments	Pre-tutorial quizzes 5% Tutorial participation 5% Assignment 1 15% Assignment 2 15% 3.5-hour end-of-semester exam (hurdle) 60%
Textbook recommendation	Would X not recommend the texts. The lectures, tutorials and review sessions are comprehensive enough that you do not require the supplementary material to consolidate your knowledge. • Gans, J., King, S., Byford, M., Mankiw, N. G. (2014). *Principles of Microeconomics: Australia and New Zealand Edition* (6th ed.). South Melbourne, AU: Cengage Learning Australia. • Borland, J. (2016). *Microeconomics: Case Studies and Applications* (3rd ed.). South Melbourne, AU: Cengage Learning Australia.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2021 Semester 1

Comments

ECON10004 provides a good window into the principles of microeconomics, exploring, and extending upon, some of the concepts taught in high school economics. The content covered is both interesting and engaging, and can be linked to real life applications.

Subject content

The first couple weeks' worth of content from ECON10004 closely follows that of high school economics, so a lot of content is similar, however is sometimes explained differently and offers a new perspective on some concepts.

1. **Introduction to Microeconomics**
   - The subject begins by introducing some of the key concepts which form the foundations of microeconomics: opportunity cost, price elasticity of demand and supply, comparative and absolute advantage, efficiency, scarcity. These are explored further in the next few chapters and are very basic so the content should not be too difficult.

2. **Perfectly Competitive Markets**
   - This topic introduces students to the demand and supply curve in the context of a market with many idealising conditions – a perfectly competitive market.

3. **Government Intervention and Market Failure**
   - This topic went through the positive and negative externalities from company actions and methods that can be implemented by the Government to correct these externalities. This topic also introduced graphical interpretations of Government intervention and externalities.

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4. **Theory of the Firm**
   - This lecture begins on talking about firms and the decisions they make in different circumstances and markets. This is also where cost, revenue, and profit come into play, and we are introduced to a more sophisticated graph to interpret data and make decisions for the firm based on it.

5. **Price Discrimination**
   - This topic presented ways that firms can act with differing amounts of information about buyers available to them, showing us the decisions firms would make to maximise profits by determining what prices to set, given a buyer's willingness to purchase.

6. **Game Theory**
   - Game theory involves many concepts which help determine outcomes in an oligopolistic market. A notable example of a concept similar to this is the *prisoner's dilemma*, and game theory just shows us how firms would act in an oligopoly in these circumstances.

Lectures

This semester, there was only one lecture stream and lectures were released on Tuesdays and Thursdays each week. The lectures, and their accompanying lecture slides, are fairly comprehensive and most of the concepts are explained clearly. My notes for this subject were just annotated versions of the lecture slides provided!

Tutorials

Tutorials for Introductory Microeconomics are compulsory, and you will be awarded a mark out of 10 for tutorial participation which will be counted towards the 5% "tutorial participation" mark. Additionally, there are 11 pre-tutorial quizzes that are released each Thursday and are due Sunday 11:59pm AEST. Your best nine scores from these quizzes are combined and count towards your 5% "pre-tutorial quizzes" mark. These quizzes are brief but are a good revision tool for the past week's lecture content.

The tutorials themselves go through the previous week's lecture content and provide practice questions similar to what will appear on the final exam. Thus, it is recommended that you pay good attention to the tutorials.

Assignments

There were two assignments, the first one covered content from weeks 1-5, while the second covered content from weeks 6-10. Both assignments were quite comprehensive and required students to really understand the subject material. It is recommended that you begin on the assignments early as they require a lot of diagram drawing which can be a deceptively tedious process.

Tip: ensure you accurately label all appropriate axes, intercepts and graph lines or risk your tutor deducting marks for these small mistakes.

End-of-semester exam

The final exam was 3.5 hours long; this included reading, writing and submission time. Though it supposedly only contained 2 hours worth of content, many students did not finish the exam within the timeframe provided. Thus, it is important that students are not only familiar with all of the content, but can also apply their knowledge to solve application questions – these made up 80% of the exam marks. Additionally, students were required to draw diagrams in the exam so this should be another consideration when revising.

Tip: for questions where diagrams are not required explicitly, it still may be useful to use one for the assessor to better understand your answer.

FNCE10002 Principles of Finance [SM1]

Exemption status	CB1 *Business Finance*, in conjunction with ACCT10002 *Introductory Financial Accounting*. An average mark of 73 across both subjects is required.
Lecturer(s)	A/Prof Asjeet Lamba
Weekly contact hours	1 × 2-hour lecture
	1 × 1-hour tutorial
Assessments	Individual Homework Assignment 15%
	1-hour mid semester exam 25%
	3-hour final exam (hurdle) 60%
Textbook recommendation	Graham, J. R., Smart, S.B., Adam, C. and Gunasingham, B. (2017). *Introduction to Corporate Finance: Asia-Pacific Edition*(2nd ed.). Cengage Learning Australia, Southbank.
	X Not recommended. The lecture notes succinctly capture all the key ideas of each topic and includes many example scenarios and questions. They are entirely sufficient for each topic to be understood at a deep level.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2021 Semester 1

Comments

POF was an eye-opener to the interesting field of finance and a well-taught subject that gave us clear insights into financial markets and many other fundamental concepts. It was the subject I personally enjoyed the most in my first semester. While the theory behind almost every topic was underpinned by mathematical equations and models, it was always explored in terms of real-life implications, which made the content much more stimulating, and less abstract than what it seems at first.

Subject content

1. **Introduction to financial mathematics**:
   - This topic introduces "the time value of money", an important concept that is relevant to any topic involving cash flows. Simple and compound interest, present and future value, different types of cash flow streams such as perpetuities, annuities and growing perpetuities and annuities are also covered.
2. **Debt securities**:
   - Explained the cash flows, present and future values associated with the common types of short-term and long-term debt securities with reference to the mathematical formulae learnt in the first two weeks.
3. **Equity securities:**
   - Examined equity securities in terms of the financial math learnt in the first two weeks, in particular how share price can be calculated and the factors that affect it.
4. **Portfolio Theory and Asset Pricing**:
   - Examines the trade-off between risk and expected return when investing in a portfolio containing different securities, and introduces common investment strategies like leveraging and shorting.
5. **Capital Budgeting**:
   - Provides insight into the strategies that companies use to decide which projects they should invest in.

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6. **Capital Structure and Payout Policy**:
   - Investigates the effect of using different weightings of debt and equity in financing a company's operations, and the implications of this for shareholders.
7. **Stock Options**:
   - Introduces another common investment strategy in which a risk-averse investor takes measures to protect their downsides. A highly useful topic for anyone interested in investing in the stock market.

Lectures

The 2-hour weekly lectures were recorded and uploaded to Lecture Capture and were always very content-heavy. After each small segment or subtopic, Asjeet would encourage us to pause the lecture to attempt an example question, which kept me concentrated and encouraged me to actively engage with the content. While it could be tempting to simply get through the entire recording as quickly as possible and not worry about the subject for another week, I highly suggest trying to enjoy and fully understand every detail of what is being taught, before moving to the next section. I often had to pause and rewind to ensure I did not misunderstand anything. This way, I just need to briefly skim over the lecture slides if a concept or topic is not fresh in my memory, instead of binge-watching every lecture again during SWOTVAC.

Tutorials

Each week's tutorial sheet was on the topic covered in that week's lecture. Worked solutions, along with a 1-hr recorded tutorial explaining the solutions in detail, are released in the week after. I found that the most efficient way to utilise these tutorial sheets was to complete them after the solutions were released. This way, I could immediately identify the subtopics I should focus on and resolve any misunderstandings I had. This also helped solidify each topic into my long-term memory, as the questions were always on the topic taught in the previous week.

Online assignment

The online assignment consisted of 15 multiple-choice questions, solely on the topic Financial Mathematics. All questions had multiple steps and did not simply involve plugging numbers into equations. Hence, instead of trying to remember what equation to use for certain question types, try to make sense of the math behind every equation and why it works.

Mid-semester test

The mid-semester exam had the identical format as the online assignment but included Topics 1-3 and had easier questions than the assignment. This assessment was entirely calculation-based and can quite easily be aced after doing all the practice questions provided.

End-of-semester exam

The final exam was open book, had a 3-hr time limit and was submitted on Gradescope. The beginning of the paper consisted of a brief section of explanation questions, while the rest of the paper contained extended response questions which mainly involved calculations. I felt that the difficulty was noticeably higher than that of the past papers, which was expected since the exam was open book. However, the exam was still very reasonable and rewarded those who put in the effort throughout the semester.

MAST10006 Calculus 2 [SM2]

Exemption status	Not an exemption subject, but it is a valid prerequisite for ACTL20001 *Introductory Financial Mathematics* (CM1 *Actuarial Mathematics I*) and the *Actuarial* major (see *Mathematics Requirement*).
Lecturer(s)	Dr Anthony Morphett Dr Antoinette Tordesillas
Weekly contact hours	3 × 1-hour lectures 1 × 1-hour tutorial
Assessments	9 individual assignments (6 written, 3 webwork) total 20% 3-hour end-of-semester exam 80%
Textbook recommendation	There are no specifically prescribed or recommended texts for this subject.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2021 Semester 2

Comments

In comparison to Linear Algebra, the content of Calculus 2 is much more similar to the mathematics one would study in high school. I also found it to be the more enjoyable of the two, due to a clearer connection between the mathematical concepts and real life, and an abundance of problem solving questions which allowed me to appreciate the real-world applications of the math taught.

Subject content

The topics covered are:

- Limits, Continuity, Sequences and Series
- Hyperbolic Functions
- Complex Numbers
- Integral Calculus
- First Order Ordinary Differential Equations
- Second-Order Ordinary Differential Equations
- Functions of Two Variables

I found *Limits, Continuity, Sequences and Series* and *Integral Calculus* more challenging than the rest. There were many rules and properties associated with sequences and series, and it can be difficult to determine which rule to choose when answering questions at times. For Integral Calculus, the difficult part to me was simplifying an integrated answer. However, by repeatedly solving similar types of questions from the green question booklet, you will definitely get accustomed to it and be able to solve integrations more easily.

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Lectures

3 1-hour weekly lectures are delivered live via Zoom, with each recording uploaded to lecture capture. At the start of every week, pre-recorded videos covering the week's content are also uploaded. For each new concept taught, worked examples are explained thoroughly, making the learning process very engaging. I personally found the pre-recorded videos to be perfectly sufficient in learning the content, but attending the live lectures will obviously have the benefit of allowing students to ask questions and resolve their inquiries on the spot.

Tutorials

The weekly 1-hour tutorials involve students working through questions on the previous week's content in a group setting. It's a great way to consolidate what's been taught, and is an opportunity to resolve any confusions by receiving help from either the tutor or other students in the tutorial.

Assignments

There were 9 assignments this semester, each containing several extended questions that either take a written form or are completed online via the WebWork platform. For the written assignments, the marking criteria for working steps is very rigorous, and should certainly be paid attention to. Sometimes, applying a seemingly obvious law without explicitly mentioning the law could cost marks.

End-of-semester exam

The 3-hour Zoom-supervised exam contained 12 extended questions for 110 marks in total, corresponding to different topics in the course. The tutorial questions provide decent revision, but doing past papers is immensely more beneficial, especially when it comes to time management. While some questions can be quite challenging, on the bright side, there is a large degree of similarity between the question types of different years' papers. As I practised more past papers, I found myself feeling more and more confident.

MAST10007 **Linear Algebra** [SM1]

Exemption status	Not an exemption subject, but it is a valid prerequisite for ACTL20001 *Introductory Financial Mathematics* (CM1 *Actuarial Mathematics I*) and the *Actuarial* major (see *Mathematics Requirement*).
Lecturer(s)	Prof Paul Norbury Dr Binzhou Zia A/Prof Craig Hodgson
Weekly contact hours	3 $\times$ 1-hour lectures 1 $\times$ 1-hour tutorial 1 $\times$ 1-hour computer lab session
Assessments	9 $\times$ individual weekly assignments 10% 45-minute written computer laboratory test in the last week of semester 10% 3-hour end of semester exam 80%
Textbook recommendation	Anton, H., & Rorres, C. (2013). *Elementary Linear Algebra,* 11th edn, Wiley X Not necessary Textbook was not mentioned throughout the semester. The lecture notes are sufficient material, so the textbook is not recommended. Ensure that you get the hard copy printed course guide in the first lecture as this contains all the set work and course materials.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2020 Semester 1

Subject content

Each topic builds and is dependent on the topic prior, gradually building in complexity. Do not be fooled by the speed and complexity of Topics 1 and 2 as these are used to acclimatize from high school mathematics to university level courses.

1. **Linear Equations**:
   - Introduced the system of equations and writing them in matrix form. This topic introduced fundamental skills such as row reduction to solve systems of equations, which was used a great deal throughout the rest of the subject.
2. **Matrices and Determinants**:
   - Extended the manipulation of matrices to include basic matrix operations as well as finding determinants and how these apply to linear systems.
3. **Euclidean Vector Spaces**:
   - This topic will be the most familiar for those who did advanced mathematics in high school. This topic introduced vectors and quickly expanded beyond the scope of the high school to more practical applications of vectors, such as finding volumes and areas. It began to show how vectors are used to describe geometric features that are already familiar, such as lines.
4. **General Vector Spaces**:
   - In this topic, the quite abstract concept of vector spaces was reduced to a more useful notion of a subspace. Personally, I found that the first part of the topic is quite confusing, seeming quite arbitrary, however, the usefulness became apparent as the topic continued into describing different sets of vectors.
5. **Linear Transformations**:
   - The introduction of linear transformations, translating one vector space to another, ties into the previous material

in topic 4.

6. **Eigenvalues and Eigenvectors**:
   - The concepts of eigenvalues and eigenvectors were introduced in this topic. Most of the emphasis is on how to find these vectors and values, with some exploration at the end for applications of this seemingly stand-alone unit to broader linear algebra.

7. **Inner Product Spaces**:
   - This topic briefly introduced inner product spaces by extending the properties of the dot product to a wider implication. This is used for the only application that is explicitly examinable, fitting a line to a set of points.

Lectures

At the beginning of the semester, with face to face teaching, there were three lecture streams. The lectures were all well recorded, with no use of whiteboards, so they were quite accessible online. Consequently, the transition to fully online teaching was smooth. The three lecturers rotated weekly and I found that, although their methods of delivery differed (some using a tablet, others using a document camera), it was a seamless learning experience.

However, I did find that all three sometimes had unreadable handwriting, with little explanation to what was written. Also, although proof is not the emphasis of the course, the lecturers would sometimes talk through a proof, which I found very difficult to follow.

The lecture slides were released on the LMS, and the students were encouraged to attend and fill in the slides as the lecture progressed, as completed slides were not released.

Tutorials

Every week there was a 1-hour tutorial, followed by a 1-hour computer lab. Attendance at these is not mandatory. I attended in person for the first few weeks of semester, and found the group work to be adequate, although not that helpful. However, it is well worth attending the computer labs, as the tutors are well versed in MATLAB beyond the scope of the course, increasing efficiency in your learning.

As the university transitioned online, so did the tutorials. I did not attend these tutorials, however the tutorial sheets and solutions are released on the LMS. The solutions are very detailed and the tutorial questions very achievable — at a similar standard to the homework problem sheets.

Assignments

Throughout the semester, the assignments were released at midday on a Monday and due by midday the next Monday. Each assignments' difficulty was similar to that of the homework problem sheets. I recommend doing the homework problem sheets in addition to the tutorial sheets.

Of the nine assignments, three were online, facilitated through WebWorks. This system was intuitive and easy to navigate, three attempts for each question and revealing if your solution is correct. The written assignments were submitted through Gradescope and Canvas. However, the marking scheme was not well communicated nor were the comments very forthcoming.

End-of-semester exams

The MATLAB test was also facilitated through WebWorks. A practice test was also provided. I found the standard of the practice test to be similar to the final exam in difficulty and timing.

The end of semester exam was Zoom-supervised. The communication about this new type of examination was very detailed and precise. The setup had to meet a few requirements. The process was easy to navigate, with exam setup checks prior to the exam and the Gradescope system working as planned. Notes were able to be taken into the exam and the timing was generous to account for any technical difficulties, leaving a more than generous amount of time to complete the exam. The practice exams of past exams were of a similar difficulty to the actual exam.

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To prepare for both these assessments, completing most of the practice material provided should be adequate.

Concluding Remarks

The organisation for Linear Algebra was very clear, with weekly emails to keep students up to date with what is expected of them. I found this subject to be constantly evolving with enough complexity to keep mathematically strong students interested while in small enough chunks that everyone can follow. Keeping up with the lectures and doing most, if not all, the homework problem sheets gives a very rounded view of linear algebra.

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MAST10008 Accelerated Mathematics 1

Exemption status	Not an exemption subject, but it is a valid prerequisite for ACTL20001 *Introductory Financial Mathematics* (CM1 *Actuarial Mathematics I*) and the *Actuarial* major (see *Mathematics Requirement*).
Lecturer(s)	Dr Alexandru Ghitza
Weekly contact hours	4 $\times$ 1-hour lectures 1 $\times$ 1-hour tutorial 1 $\times$ 1-hour lab workshop (using MATLAB)
Assessments	3 $\times$ individual online assignments (completed through WebWorks) 6% 3 $\times$ individual written assignments 9% 1-hour online MATLAB test 5% 3-hour end-of-semester exam 80%
Textbook recommendation	Anton, H., & Rorres, C. (2010). *Elementary Linear Algebra* (10 ed.). John Wiley & Sons X Do not recommend.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2020 Semester 1

Subject content

1. **Linear Equations, Vectors, Matrices**:
   The fundamentals of the Linear Algebra content all rely on a good understanding and ability to work with vectors and matrices. Although linear equations are not as prevalent as the other two topics throughout the subject, it is also required through some interpretation methods and is useful for calculus.
   Vectors were worked through from a 2D and 3D perspective as well as linear equations, which was the only real new topic introduced in MAST10008. Other topics such as orthogonal projections and the dot product was knowledge carried over from high school.

2. **Proofs**:
   This topic personally was one of the more difficult topics to learn well as the method of thinking about a proof must be very specific to each circumstance-thinking about it in a different way would create a lot of chaos and lead to dead ends. The topic starts by exploring Number Theory and understanding sets, then moves onto common proof techniques, which was thoroughly explored in the first written assignment of the semester. The best way to become familiar with this topics is to expose yourself to numerous examples to see how common proofs are handled.

3. **Vector Spaces**:
   Vector spaces was the most content-heavy topic, taking a couple of weeks to work through all of the subject matter. Some may find it awkward working with vector spaces as it is not a concept we are very familiar with and takes a little getting used to.

4. **Linear Transformations**:
   This topic leads on from vector spaces and brought the subject into a world where it is a little less arbitrary, and can be imagined (in 2D or sometimes, even 3D). This topic worked through the idea of eigenvalues and eigenvectors, and also leads into transformation matrices and change of base matrices.

5. **Inner Product Spaces**:
   This topic is very similar to the existing idea of dot products, however there are more rules to abide by.

6. **Functions in 2 Variables**:

   This topic officially closed the linear algebra section of the subject and started the Calculus 2 content. Functions in 2 variables is really just an extension from high school knowledge, with a couple more steps. It clicks very quickly and is fairly easy to pick up.

7. **Complex Numbers**:

   This topic was covered very quickly, due to most of the content overlapping with the complex numbers topics taught in high school. The only extension was learning about differentiation and antidifferentiation where it is possible to 'piggyback' off complex number ideas to solve harsh real number problems.

Lectures

The four, 1-hour lectures, spread over Monday, Wednesday, Thursday and Friday, were pretty manageable, since they were all bite-sized and gave ample time to process what was taught during that lecture. The lectures consisted of Alex explaining a mathematical concept and then moving onto a number of examples of varying nature, which let us better understand the topics. Lectures are fully recorded and the working out made by Alex can also be seen which made re-watching lectures (or in our case, just watching) very useful.

Tutorials

Tutorials are run weekly in 1-hour sessions where worksheets are given out (also uploaded onto canvas) and the questions are worked through individually, in groups, or altogether, under the supervision of a knowledgeable tutor. The last question on each worksheet usually posed a challenge to most of us, making us work hard to finally manage a solution. Tutorial attendance and participation is not required for MAST10008, however is highly recommended to solidify the content learnt from the previous week's lectures.

There are also weekly 1-hour MATLAB sessions, where directly after your tutorial, you will head to a computer lab and work on learning MATLAB syntax and learning to interpret your results. MATLAB skills are examined in a 1-hour test towards the end of the semester, so the MATLAB sessions are strongly recommended to quickly learn the functions and how to effectively use commands to solve a problem.

Assignments

The assignments were spread out across the semester and alternated between WebWorks assignments and written assignments. There were 3 of each type this semester, with WebWorks assignments being more easily completed relative to the written assignments. The WebWorks assignments were a handful of questions that required straight forward calculations which tested on whether we were able to apply the content learnt in previous weeks and were quite easy to complete as long as you understood the lectures beforehand. The written assignments were a little more difficult as they required more lateral thinking rather than blindly applying the things we learnt in the lectures. The questions posed some difficulty and gave us the chance to realise where we needed to know the content at a deeper level.

End-of-semester exam

The final exam was much easier than the written assignments throughout the semester, acting as a test, instead of a learning opportunity. This gave a lot of us relief once we saw the questions and felt a sense of home as we recognised all of the problems and knew broadly how to work through them. The time management was very relaxed; having 3 hours to complete the exam was more than enough.

Resources

All of the resources required and recommended for this subject are available on Canvas. I did not open the recommended textbook at all, instead I relied on re-watching lectures and Google to hold my hand through questions I was not familiar with. Lectures, tutorial worksheets, MATLAB instructions, MATLAB software are all available through Canvas to download and to use.

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Concluding Remarks

MAST10008 is a very content-heavy subject and is taught at a fairly fast pace compared to some other mathematics offered. However, the content covered logically moves from one area to the next and the examples and information Alex fed us is very useful for both in a mathematical sense and for real-life applications (sometimes).

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MAST10009 Accelerated Mathematics 2

Exemption status	Not an exemption subject, but it is a valid prerequisite for ACTL20001 *Introductory Financial Mathematics* (CM1 *Actuarial Mathematics I*) and the *Actuarial* major (see *Mathematics Requirement*).
Lecturer(s)	Prof. Barry Hughes
Weekly contact hours	4 × 1-hour lectures 1 × 1-hour tutorial
Assessments	2 × Individual assignments 10% Mid-semester test 10% 3-hour end-of-semester exam 80%
Textbook recommendation	*MAST10009 Accelerated Mathematics 2 Textbook*, Barry Hughes, 2020. This textbook contains all material from every lecture covered in the semester and provides many additional learning problems to be completed after each lecture. As the lectures and tutorials are based upon this textbook, this text is ✓ highly recommended.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2020 Semester 2

Overall Comments

MAST10009 Accelerated Mathematics 2, builds on MAST10008 *Accelerated Mathematics 1*, to cover prerequisites for 3 mathematics subjects, being MAST10005 *Linear Algebra*, MAST10006 *Calculus 2*, and MAST20006 *Real Analysis*.

MAST10009 Accelerated Mathematics 2 was a very difficult subject to keep up with given its amount of content, however, as you follow the lectures throughout the weeks, the content becomes very interesting and requires deep thinking to fully understand the concepts and methodology used. Keeping up to date was a challenge, however, given the structured manner Barry employs, was very easy to catch up.

Subject Content

1. **Sequences**: This topic builds on topics touched in high-school mathematics, looking at the idea of limits in a more formal method. The lectures cover concepts of convergence, divergence, asymptotic behaviour, and limits. These topics were covered in-depth with definitions required to be known for the assessments throughout the semester.
2. **Functions, limits and continuity**: This topic builds on the idea of limits and sequences, looking at various theorems for continuous functions. These concepts are assessed throughout the semester, so definitions and methodology should be closely followed from the lectures.
3. **Differential calculus**: This topic builds upon high-school calculus, looking at various rules while differentiating, and introducing new theorems such as L'Hopital's Rule, and the Mean Value Theorem. On top of these theorems, hyperbolic trigonometric functions are also covered, looking at identities and alternate methods of denoting these functions.
4. **Integral calculus**: This topic reviews integration and introduces new ideas such as Riemann sums, and Darboux integrals. These lectures are very content heavy and required additional time to process these ideas. The last couple of lectures in this topic covers techniques such as integration by parts and looks are different substitution integrals.
5. **Differential equations**: This topic looks at various types of differential equations and methods on how to approach and solve these equations. Some differential equations include population growth, motion and drag, and RC and LR electric circuits. These differential equations are assessed throughout the semester, so gaining a solid idea on

how to approach these questions are required.

6. **Improper integrals**: This topic revisits integrals, specifically the idea of an indefinite integral, looking at where a function may be undefined or where a terminal for the integral is infinity. This topic explores the improper Riemann integral as well as various tests in assessing improper Riemann integrability.

7. **Infinite series**: This topic is the last topic covered in this subject and looks at infinite series of both numbers and functions. This topic focuses more on conceptual understanding and works on looking at determining the convergence or divergence of the series using number tests. This topic also contains various definitions, which will need to be recalled during assessments throughout the semester.

Lectures

The content throughout the semester was covered rather quickly, delivered through four 1-hour lectures throughout the week. During each lecture, topics are introduced by Barry and he works through some textbook example questions to solidify the concepts. This method of delivery was very useful, as we could clearly see how answers were meant to be set out and solved. The lectures are required to do well in the assessments as they cover each topic in-depth, however, as each lecture was very structured and was kept in order by the textbook, finding a specific lecture on topics that were missed is quite easy.

Tutorials

The tutorials for MAST10009 Accelerated Mathematics 2 were not compulsory, however, were a good source of time to clarify any questions for the problems from the textbook. These tutorials were mostly a time for students to discuss these queries, however, these tutorials worked out to be quite unnecessary as any questions could be brought up during consultation hours to be clarified. The tutorials were mostly used to work through questions from the textbook from the week, however, is quite repetitive if you had no trouble working through and answering the questions on your own.

Assignments

There were two assignments spread over the semester, each worth 5% of your total grade. These assignments were relatively difficult compared to the examples covered in class and problems in the textbook, and as Barry requires a high level of rigour and precision, the assignment is difficult to wholly complete. Each assignment was due within two weeks, and given the difficulty of some questions, leaving the assignment to the last couple of days is not recommended.

The mid-semester test was a 45-minute supervised test which was worth 10% of the final grade. These questions in the test were easier compared to the questions posed in the assignments, however, the same degree of rigour and precision was expected to be displayed in the responses. The test also contained questions requiring specific definitions to be recalled, so having a good understanding of definitions of all concepts covered beforehand is recommended.

End-of-semester Exam

The end of semester exam was out of 124 marks this year and followed closely in the structure of the mid-semester test, however, contained a couple of questions that required longer responses regarding series and proofs. The exam was mostly similar to past MAST10009 exams, except there were fewer differential equation questions presented this year. Again, definitions and theorems were required to be recalled for the exam and made a significant portion of the exam.

Second-Year Subjects

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ACTL20001 Introductory Financial Mathematics

Exemption status	CM1 *Actuarial Mathematics I*, in conjunction with ACTL30003 *Contingencies*. Satisfactory performance across both subjects is required.
Lecturer(s)	Dr Ping Chen
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour tutorial
Assessments	2 × Individual assignments 2 × 15% = 30% 3.5-hour end-of-semester exam (hurdle) = 70%
Textbook recommendation	No textbook is explicitly mentioned. However, selected problems were given as additional questions from: Fitzherbert, R., & Pitt, D. (2013). *Compound Interest and its applications*. Melbourne, AU: University of Melbourne Custom Book Centre. It may be worth while to borrow a copy.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2021 Semester 1

Subject content

1. **Data and Basics of Modelling:** A theoretical part of this subject that is easy to understand. This topic introduces you to data analysis, data collection and big data. Helpful to spend time to familiarise yourself with the concepts as it is an important part of the CM1 syllabus.

2. **Principles of Actuarial Modelling:** Theory about models, their impact, limitations, advantages and disadvantages. Another relatively straightforward topic.

3. **Cashflow Models:** Introduction to zero-coupon bonds and fixed-interest securities. This is the start to the core concepts of this subject.

4. **Fundamental Concepts:** This topic involves time value of money, different interest rates and calculating the present and accumulated values. Solidify your understanding by exposing yourself to various practice problems.

5. **Valuing Cashflows:** Introduces the different types of annuities that you should have already touched upon in ACTL10001. The only new concept is annuities of payment subject to linear variations. It is pretty straight forward so remembering the formulae might be your only challenge. This semester however, since the exam was open book, we did not face this issue.

6. **Financial Analysis of Loan Contracts and Business Projects:** A topic on loan repayments and project evaluation methods. You may be somewhat familiar with these concepts from ACTL10001 *Introduction to Actuarial Studies* and FNCE10002 *Principles of Finance*.

7. **Characteristics of Major Asset Types:** This is a straightforward theoretical chapter which gives a brief introduction into major asset classes. Personally, I appreciated this chapter as actuarial students in general lack basic financial literacy and jargon understanding in comparison to the average finance major student.

8. **Applications in Asset Markets:** Introduces the concept of immunisation and assessing bond prices adjusted to inflation in depth. The latter half explains the different interest rates available in the bond market structure and discusses their respective yield curves.

Lectures

The lecture slides are provided to you at the start of the semester so it is highly recommended to have a bound hardcopy of it so you can follow along with the content during the lecture as well as easily flick through to review topics during your study. The lectures provide a good foundation to the concepts but would require practise on more complex problems to solidify your understanding and be exam-ready.

Tutorials

The tutorials are helpful as they allow you to discuss the tutorial questions with your peers and the tutor as well as solve any queries regarding the content that you may have. The tutorial questions and answers are uploaded on canvas so you may attempt and correct them without attending the tutorials if you wish.

Assignments

There are two individual assignments worth 15% each. The first assignment was a straightforward application of the concepts and mathematics taught in weeks 1-6. The second assignment required students to act as consultants and provide financial advice to a client regarding their home loan. The content taught in lectures was a foundation to this assignment but more importantly required us to do our own research on the characteristics involved with home loans and mortgages. Calculations and loan schedules are also involved. We then need to apply our research and calculations to outline recommendations to the client for various situations. Don't forget to add references if you take any information from websites.

End-of-semester exam

The end-of-semester exam was three and a half hours long. All questions must be written, scanned and uploaded. There were two parts to this exam consisting of ten multiple choice questions and ten calculation questions. The multiple choice questions were rather straightforward and covered most of the theoretical concepts in the subjects. Students must select all correct options for each question otherwise no marks are awarded. The calculation questions were relatively more tough than the multiple choice and harder than those on the practise exam. I would highly recommend practicing as many calculation questions as you can before the final exam.

ACTL20003 Stochastic Techniques in Insurance

Exemption status	Not an exemption subject, but it is a prerequisite for Actuarial Modelling I, Actuarial Modelling II and Actuarial Modelling III (CS2 *Risk Modelling and Survival Analysis*).
Lecturer(s)	Prof Shuanming Li
Weekly contact hours	2 $\times$ 1-hour lectures
	1 $\times$ 1-hour tutorial
Assessments	2 $\times$ group assignments 2 15%
	2-hour end-of-semester exam 70%
Textbook recommendation	None
Lecture capture	Full (both audio and video)
Year and semester reviewed	2021 Semester 2

Subject Content

1. **Three types of random variables and their characteristics**:
   - Probability basics from MAST20004, with some additional details sprinkled in here and there regarding simulation and actuarial applications of the random variables. Whilst this topic began with familiar content, the subtopic on mixed variables was particularly tedious and was the first hard section of the subject.

2. **Characteristics of sum of i.i.d. random variables**:
   - Again, covered familiar material from MAST20004 such as convolution and CLT, but very crucial to some other proofs and theories later in the subject.

3. **Conditional Probabilities and Conditional Expectations**:
   - This topic was a more in-depth foray into the subtleties of conditional probability, expanding on briefly covered ideas in MAST20004. Learning this topic well and becoming confident with conditioning random variables is necessary for calculations further along in the subject.

4. **Generating transform (function) and applications in solving difference equations**:
   - Short topic on solving difference equations, and introduced a new tool to do so. Whilst the maths is more straightforward compared to the other topics, deriving the correct mathematical relationship from the worded scenario in the question could sometimes get difficult.

5. **Ordinary Differential Equations (ODE)**:
   - Covered how to apply a compound interest interpretation to familiar forms of ODEs from calculus.

6. **Laplace transform (LT) and applications**:
   - Almost a continuation of the previous topic, this time using the Laplace Transform and its properties to solve ODEs. Topics 5 and 6 are both kept short and sweet.

7. **Poisson Process**:
   - This topic gave rigorous definitions to the Poisson process, and derived the quantities and distributions of interest that come from it. I found this to be quite hard, but tutorials shed a lot of light on this. This is a very dense topic.

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8. **Brownian Motions and Geometric Brownian Motions**:
   • Another tough topic on stochastic processes, which covered the definitions and properties of Brownian motion and Ito's integrals. In these last 2 topics 7 and 8, its crucial to understand the properties to perform calculations.

Lectures

Lecture content for this subject was very fast paced. Each recording was densely packed with information, but very clearly taught and well structured. Shuanming's delivery was very clear and engaging throughout the entire subject. The provided lecture notes were enough to give a general idea of the properties and important definitions in each topic, but key derivations and explanations were only provided the lecture recordings. I recommend being very thorough watching the lecture for the first time, as there were a lot of key details and techniques that were covered in the lecture to be applied to tutorial questions – getting a good grasp of these before attempting questions would save students a lot of time trying to find the corresponding section of lecture recordings.

Tutorials

Tutorials were recorded, with attendance not being assessed. The sheets, answers, and tutorial recordings are all available on the LMS. The structure of tutorials involved a quick recap of the week's content, then moving onto covering solutions of the week. I found the quality of the tutorials to be very good, tutors are often able to provide some much-needed intuition behind tricky concepts and derivations, as well as handy tips and tricks to help perform calculations.

Assignments

There were 2 group assignments for this subject, with the option of doing it solo, but this is almost a non-option since the questions get quite tough. Having group mates to bounce ideas and insights off of makes the process of completing these much less painful. I'd also recommend attempting the entire assignment together as a group, since every question provided a great opportunity to study the content and test your handle of it. Combined, the assignments cover every topic save for the final parts on the Ito integral, which pressured students to keep up to date with the content, or else they'd be unable to contribute to the group.

End-of-semester Exam

The final exam for this subject was 3 hours and 15 minutes long, with a mix of true/false, multiple choice, and long answer questions. Shuanming was extremely generous, pointing out the important techniques and relevant assignment and tutorial questions for us to cover. A practice exam was also provided. Following his recommended exam study regimen made it very easy to cover what was needed. That being said, on the exam of the semester reviewed, brief sections of other topics still appeared on the exams.

ACTL20004 Topics in Actuarial Studies

Exemption status	CM2 *Financial Engineering and Loss Reserving*, in conjunction with ACTL30006 *Intermediate Financial Mathematics* and ACTL40004 *Advanced Financial Mathematics*. Satisfactory performance across all three subjects' end-of-semester exam is required.
Lecturer(s)	Dr Zhuo Jin
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour tutorial
Assessments	2 × Individual assignments 2 15% 3.5-hour end-of-semester exam 70%
Textbook recommendation	None
Lecture capture	Full (both audio and video)
Year and semester reviewed	2021 Semester 2

Overall Comments

Topics in Actuarial Studies as its name suggests covered many topics within actuarial studies. Instead of going deeply in any particular topic, it touched briefly on a range of content as shown below. This subject loosely builds off the knowledge of previous subjects including Probability MAST20004 and IFM ACTL20001 as well as the Poisson Process from ACTL20003 which runs at the same time. Overall, this subject introduced a variety of interesting and basic techniques which I enjoyed as it showed the more practical applications relevant to actuarial studies.

Subject Content

1. **Measures of investment performance –** Introduces basic concepts surrounding how to assess the past performance of funds. It delves into a variety of ways to calculate rate of return and their purpose.
2. **Valuing with defaults** – This is one of the longer units. It delves further on the topic of accounting for uncertainty when calculating present values. It also goes into how we can discount and accumulate cash flows when interest is an i.i.d. variable. Life insurance applications, lognormals and simulations are also covered in this unit.
3. **Dependent interest rates**: Covers the time series models in particular the autoregressive process and the moving average process. It covers their properties and how to calculate their autocovariance and autocorrelation and simulate them.
4. **Chain Ladder Method**: This unit is all about how to calculate outstanding claims provision through a variety of techniques, including the chain ladder method, average cost per claim method and BF method.
5. **Definitions of ruin**: Ruin is similar to bankruptcy for insurance firms. This unit covers what it actually is. how to calculate it and its interaction with reinsurance.
6. **Basic derivative securities**: This chapter might feel like a continuation of the final chapter in ACTL20001. You will be introduced to futures and options, the concept of arbitrage and how the *principle of no arbitrage* and *law of one price* is used to derive the price of a forward contract. Again, the key to being successful in this section is understanding the financial jargon.

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Lectures

There were 2 1-hour lectures per week pre-recorded by the lecturer. They would come out on the day they were scheduled. I found the lectures to be quite intuitive and the slides to be easily followed and reviewed. I found that the speed of lecturer and his content to be at a good pace, as the lecturer would often give longer explanations and plenty of examples to help understand the content.

Tutorials

Tutorials were held live once per week covering the previous weeks lecture content. There was also a recording of a tutorial posted on the LMS. Tutorials are a great place to check your answers, however the one I had did not provide much interaction with the tutor or the other students. An important part prior to the tutorials would be to actually attempt the questions beforehand as otherwise it is hard to follow along. The tutorial handouts themselves were overall not too lengthy to complete.

Assignments

There are two individual assignments each worth 15% on Excel. The assignments were an extension of the content discussed in the lectures. Throughout the lectures, the lecturer would also showcase similar Excel spreadsheets as well. Being able to follow the lectures relating to the assignment and having basic Excel skills such as autofill and random values are a key to succeeding in these assignments.

End-of-semester Exam

The exam was an LMS quiz worth 70% of the overall mark, it has 15 minutes reading and 3 hours of writing/scanning time. The exam was out of 70 marks and was open book. There were no multiple-choice in this year's exam however, there have been some in previous years. There are quite a few concepts that are covered in the subject and having a good grasp of each is important in the final exam. The exam required scanning and uploading to Canvas, so would recommend practicing this beforehand and setting aside around 30 minutes to do so.

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ECON20001 Intermediate Macroeconomics [SM2]

Exemption status	CB2 *Business Economics*, in conjunction with ECON10004 *Introductory Microeconomics.* An average mark of 73 across both subjects is required.
Lecturer(s)	Dr Yusuf Mercan Dr Faisal Sohail
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour tutorial
Assessments	2 × online multiple-choice test 2 5% = 10% 2 × assignments 2 15% = 30% 3-hour end-of-semester exam 60%
Additional Information	This subject is a core subject to double major in *Economics* with *Actuarial Studies*
Textbook recommendation	Olivier Blanchard (2017). *Macroeconomics.* Seventh Global edition. Pearson. X Do not recommend.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2021 Semester 2

Overall Comments

Content-wise, similar to *Introductory Macroeconomics*, you spend time developing these seemingly strange models that attempt to explain economic activities. The main difference is that in this course, you begin to appreciate the effectiveness of these models a bit more and consider how particularly important variables were determined (endogenous vs exogenous). Overall, ensure you understand the purpose of each model in terms of how they fit together and how to derive them as this will ensure you truly comprehend their purpose and are ready for any complications posed by exams and assignments.

Subject Content

The course is separated into 2 main broader themes:

1. In the short-run, the macroeconomy experiences cyclical ups and downs (booms and recessions). To understand short-run fluctuations, the focus will be on changes in aggregate demand.
2. In the long-run, the underlying or trend rate of economic growth dominates. To understand long-run growth, the focus will be on changes in aggregate supply. The course commences with a focus on the short-run fluctuations which naturally lends itself to a discussion of short-run monetary and fiscal policy. The course then turns to issues of macroeconomic adjustment and explores how the economy responds to shocks and long-run economic growth.

Detailed breakdown:

- **Weeks 1–4**: IS/LM Model
  This topic gives students a chance to recap the contents from first-year economics. It particularly highlights the relationship between output and inflation by way of action taken by the government (fiscal) and reserve bank (monetary). This topic is extensively covered in the first multiple choice test.
- **Week 4**: Unemployment Model
  This topic is heavily tested in the first assignment but the content is rather digestible. Understanding of the models, their purpose and how to derive will be beneficial for the rest of the subject and the exam.

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- **Weeks 5–7**: Dynamic AD/AS Model

  The Dynamic AD/AS model goes further than previous models of the macroeconomy in that it includes an array of variables beyond inflation and output. There is an extensive derivation process that originates from 5 key formulae.
- **Weeks 8–10**: Solow-Swan and Growth Models

  An introduction of more models that map economic growth. You will start to notice that you must do more than memorise formulas as the questions require you to prove that you understand these models and how to apply them. Ensure you have set a good foundation in understanding these models from the previous topics.
- **Weeks 11–12**: Open Economy IS/LM Model

  This is a return of the first topic, however with additional levels of complexity as it now caters for an open economy. Often the effects will be intuitive, however it is important to think about things logically and ensure your resultant net income shown by your model is consistent with that.

Lectures

The semester's lectures are split in half whereby the first half of the semester is taught by Yusuf and the second half by Fasail. Each lecture involved the introduction of a new model or elaboration on ones previously covered. Both lecturers also complimented their teachings with empirical evidence and real-life examples, which is helpful for framing the content as the models could at times seem overly abstract and general. At the end of every section, there would also be a practice exam question related to the topic that they discussed.

Tutorials

These ran in a typical way with economics subjects. We were given pre tutorial and in tutorial work to do. Types of questions included true/false, short answer and extended response. They were excellent for testing your understanding and making sure you are across the niches of the model. True/false prepared you well for the multiple-choice quizzes, whilst the extended responses were very helpful when it came to exams and assignments. The extended questions revolved around the introduced model, whilst introducing additional levels of complexity.

Quizzes

There were two quizzes in the form of multiple-choice questions. Administered over Canvas, these were particularly focused on the models introduced. Both gave you 30 minutes to do 15 questions. Whilst you need to understand the models, most of the questions can be done mentally. The second quiz was a bit more theoretical, so ensure to have lecture slides easily accessible.

Assignments

Both assignments could be chosen to be completed individually or as a group of your choice (max. 3 people per group) with a 1500 word limit. It is vital that you are able to find the right formulas to apply, make appropriate adjustments and elaborate in explanations to demonstrate your understanding. Explanations are not time consuming however there are a number of graphs that you must create in excel and include in your assignments.

End-of-semester Exam

Exam structure:

- Section A: 12 Multiple-Choice Questions
- Section B: 3 Short Answer Calculation and Explanation Questions (Pick 2)
- Section C: 3 Short Answer Calculation and Explanation Questions (Pick 2)

Each question in Section B and C tests a particular topic in the subject, however, it is important to have a broad understanding across all the potential topics as there is no standard pattern of content covered across these sections. Completing past exam questions will be beneficial for the exam overall as the questions can be somewhat similar. Additionally, mid-semester quizzes is a good source to test your knowledge for Section A. Section B is generally similar to tutorial questions with process-driven calculations based on the standard models. In Section C, you must display your understanding of the models as they will give you certain adjustments that you have not been exposed to before.

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MAST20004 Probability [SM1]

Exemption status	CS1 *Actuarial Statistics I*, in conjunction with MAST20005 *Statistics* and ACTL30004 *Actuarial Statistics*. Satisfactory performance across all three subjects is required.
Lecturer(s)	Prof Aihua Xia Dr Sophie Hautphenne
Weekly contact hours	3 × 1-hour lectures 1 × 1-hour tutorial 1 × 1-hour MATLAB session
Assessments	4 × Individual Assignments 4 5% = 20% 3-hour end-of-semester exam 80%
Textbook recommendation	Ghahramani, S. (2005). *Fundamentals of Probability, with Stochastic Processes (3rd ed.)*. Upper Saddle River, US: Pearson Education. X Not necessary This textbook was never explicitly used, so I X do not recommend purchasing it.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2021 Semester 1

Subject content

1. **An introduction to probability and its axioms:**
   - Revision of the foundations of probability learnt in high school and builds a predominant focus on probability axioms as well as independence, conditional probability and mutual exclusion. Ensure you are familiar with axiomatic proofs and questions involving Law of Total Probability and Bayes' formula as these show very consistent trends in past exams.

2. **Probability distribution functions and Random Variables**
   - This expands from the binomial and normal distributions taught in high school. However, no prior knowledge is assumed and it is all taught from scratch. A range of 14 discrete and continuous distributions and their characteristics is involved in this topic. A summary table of the distributions would be helpful, but it is not necessary to study each one intensively.

3. **Bivariate Random Variables and Correlation**
   - This is probably the most challenging topic in this subject where you now deal with two random variables. You should practise representing the relevant probability areas through a diagram as this would be the most clear and easiest way to understand and complete the questions. Additionally, the concepts of correlations and covariance are introduced. Ensure the relevant formulas are included in your cheat sheet.

4. **Generating Functions, Limiting Distributions, Branching and Stochastic Processes**
   - Take some time to understand these concepts and dive straight into past exam questions. The questions show high consistency in past years and will assist your understanding on these topics on the way.

Lectures

Just like other maths subjects, there are three one-hour lectures a week. The lecture slides are provided to you at the start of the semester so it is highly recommended to have a bound hardcopy of it so you can follow along with the content and examples during the lecture as well as easily flick through to review topics during your study. Professor Aihua held in-person and live lectures (through zoom) at the same time and it was also recorded and uploaded on Lecture Capture. There were sometimes technical difficulties but still worth it if you prefer to ask questions during the lecture (live). If you are just watching your lectures on Lecture Capture then Sophie's lectures are recommended. Her lectures are pre-recorded and uploaded week-by-week, so if you feel like watching all three lectures in one day, you can. Sophie's lectures are solid and cover everything you need to know with neater notes. Keeping up with the lectures is a must, as the content is covered relatively quickly and may take a lot of effort to catch up once you fall behind.

Tutorials

We had weekly quizzes during the first 20 minutes of the tutorial, discussed the answers as a class with the tutor and broke out into groups to complete tutorial questions on the whiteboard. The tutor would come around to each group every now and then to correct our work and answer any questions we might have. The tutorials are helpful but not overly necessary in my opinion. You can complete the tutorial questions at home and utilise the zoom consultations which would be equally effective.

Assignments

The assignments usually consist of four to five questions. Two questions are randomly selected and marked while the other questions are given one mark each for attempting. I highly recommend using the assignments to test your understanding as they are similar to the exam questions. It is important that you do well in the assignments as it not only affects your overall mark but is an indicator of whether you are understanding the topic or falling behind.

End-of-semester exam

The most effective way to improve your performance on the exam is to do past exams. These are provided to you with answers two weeks before SWOTVAC. Questions follow similar patterns and many questions are very consistent, you can get a very good idea of your exam structure from past exams. Go through your lecture slides and include all relevant formulas in your cheat sheet as well as concepts that have popped up in past exams that you are not familiar with.

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MAST20005 Statistics [SM2]

Exemption status	CS1 *Actuarial Statistics I*, in conjunction wtih MAST20004 *Probability* and ACTL30004 *Actuarial Statistics*. Satisfactory performance across all three subjects is required.
Lecturer(s)	Dr Damjan Vukcevic
Weekly contact hours	3 × 1-hour lectures 1 × 1-hour tutorial 1 × 1-hour laboratory session
Assessments	3 individual assignments 20% 45- minute R computer test 10% 3-hour end-of-semester exam 70%
Textbook recommendation	Supplementary textbook written by the University of Melbourne for MAST20005. Textbook is freely available for download off the Canvas website but was never explicitly referred to. Nonetheless, it can form useful background reading if the lecture slides are insufficient. No harm in downloading for future reference — X not essential.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2021 Semester 2

Overall Comments

MAST20005 Statistics naturally follows from MAST20006 Probability to develop basic statistical building blocks for further study in Actuarial, Economics or Finance.

However, I have found Statistics to be considerably less time-consuming and rigours comparing to Probability. So, if you have found Probability to be manageable, Statistics shouldn't be too much of a challenge. It is quite a mechanical, formulaic subject.

In particular, once you understand the first few fundamental concepts in Statistics, such as Estimators, Confidence Interval, Hypothesis Testing, the assignments and exam should prove to be quite straightforward.

Subject Content

1. **Introduction and Review of Probability**
   - The first module was a very basic introduction to statistics and mainly a review of probability concepts from MAST20004 *Probability*. All probability concepts covered in this module were assumed knowledge, and it is vital that these concepts are well understood as many statistical ideas rely on them.

2. **Point Estimation**
   - This was the first time that students were exposed to formal statistical concepts. It formalises the idea of estimators. Ensure that you have a strong grasp of the difference between a sampling distribution and population distribution, and how estimators are ultimately random variables. In particular, *Maximum Likelihood Estimators* are used very often throughout the subject in various settings, so a good understanding of this concept is key.

3. **Interval Estimation (2 modules)**
   - This module followed closely from the previous module on *Point Estimation* and seeks to provide more information about a population through *confidence* and *prediction intervals*. Deriving a *confidence* or *prediction intervals* is very formulaic but it is crucial that one understands the subtle differences between the many formulas and is also aware of the situations where each formula is appropriate.

4. **Regression**

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- *Regression* was found generally to be one of the more conceptually difficult modules in this course. While this is an idea that many of us have encountered before even in high school, this is the first time that you will learn the underlying concepts behind this widely used statistical method. Ensure that you completely understand the derivations behind the model and the assumptions that are made.

5. **Hypothesis Testing**
   - Overall, this was probably one of the easiest topics in terms of conceptual difficulty. It utilises the same ideas from *Interval Estimation* but in a slightly different context. Again, ensure that you understand when and why certain tests are one-sided or two-sided as this will appear in later modules.

6. **Order Statistics, Quantiles and Resampling**
   - This module introduced sampling distributions for estimators such as the sample median, maximum and minimum. Overall, a fairly manageable topic with a few tricky concepts around approximate confidence intervals.

7. **Bayesian Estimation**
   - While *Bayesian Estimation* is inherently different from classical estimation, it is quite easy to understand and apply in the situations that you will be presented with. Understanding the process of using a *prior distribution* in conjunction with collected data to derive a *posterior distribution* is the most important idea.

8. **Asymptotics and Optimality**
   - The last topic was of intermediate difficult. Although some concepts were quite tricky to grasp, they were rarely assessed. The main ideas that needed to be well understood related to theory about the *MLE* and the *Cramer-Rao lower bound*, which was tested often.

Lectures

Unlike other subjects, each Statistics module is broken down into around a dozen concepts (each video is around 10 minutes) and released in the week prior. This way, you can watch the lectures at your own pace and was very beneficial when it came to revision for exams or for the lab test

Overall, the lectures were informative and Damjan did a great job of explaining the intuition behind each statistical method and concept. The lecture notes were sufficient to perform strongly in this subject. They covered content to good detail but still left room for you to add your own annotations and notes to build your understanding.

Tutorials and Lab Sessions

Tutorials and Lab are both done online in a 2-hour block. The tutorials usually run overtime and end up taking around 75 minutes while labs take around 45 minutes. You are allocated into small breakout rooms and attempt the tutorials questions. The tutor roams around the breakout rooms responding to help requests.

Assignments

The assignments are quite straightforward consisting of some calculation questions and R questions. You do need a fairly good understanding of the underlying R codes used in lectures and tutorials to easily tackle the R questions.

End-of-semester Exam

The final exam was held in strict Zoom-supervised conditions. Overall, I felt that the exam in 2020 was around the same difficulty as previous years (perhaps easier than 2019). The exam structures are quite similar from year to year so it is very important to become familiar with the type of questions that may appear. One question that many of us found particularly tricky this year (which was something that had not previously been tested before) was deriving estimators for a slightly different regression model. This question was not particularly difficult if you understood all the derivations in *Hypothesis Testing*, but it goes to show the importance of understanding concepts rather than being able to use the formulas.

MAST20026 Real Analysis [SM2]

Exemption status	Not an exemption subject, but it is a valid prerequisite for ACTL20001 *Introductory Financial Mathematics* (CM1 *Actuarial Mathematics I*) and the *Actuarial* major (see *Mathematics Requirement*).
Lecturer(s)	Dr Christopher Duffy
Weekly contact hours	3 $\times$ 1-hour lectures 2 $\times$ 1-hour tutorials
Assessments	5 Individual assignments 20% 3-hour end-of-semester examination 80%
Textbook recommendation	None, a problem booklet of questions is provided. This is not necessary to print out but definitely ✓ recommend working through
Lecture capture	Full (both audio and video)
Year and semester reviewed	2021 Semester 2

Comments

Real Analysis is a second-year pre-requisite to many third year maths subjects. The aim of this subject is to dig deeper into previous knowledge, especially from calculus 2 to question the fundamentals of maths. The course is built from the ground up, with prerequisite content mentioned but not explicitly built upon. I found the content to be fascinating as it deep dives into the concepts you already know, such as limits and continuity and proves them to you from the fundamentals of maths. Chris is also an incredible lecturer, explaining all the concepts in a clear and concise way. Also his notes are thorough and extensive.

Subject content

1. **Mathematical Proof and Logic** – introduction to the concepts of truth tables and proof logic (eg. direct proof, proof by contradiction, etc.)
2. **Set Theory** – focus on constructing the real and rational numbers from sets
3. **Real Numbers** – Different properties of real numbers using the real number axioms
4. **Functions and Sequences** – introduces techniques regarding sequence convergence and divergence
5. **Limits and Continuity** – focuses on proving limits of functions and introduces formal definition of limits and continuity
6. **Differentiability and integrability** – introduces formal definitions of differentiable and integrable
7. **Fourier Series**

Lectures

Chris is a fantastic lecturer. I thoroughly enjoyed his methodical nature of teaching and looked forward to reading the supplementary notes. The lectures were in an unusual format, where the three lectures were pre-recorded and posted on the LMS on Monday of each teaching week. The total lecture time was well below the stated 3 hours, likely closer to an hour a week. However the videos were only used as an introduction to the concept rather than a thorough deep dive, so reading the supplementary notes is a must. The examples that appear in tutorials, assignments and exams are based on the material in the notes. I found this method of teaching to be very effective, especially when online learning made watching lectures very monotonous and boring especially with my shortened attention span.

The supplementary notes also had a very short "testing your understanding" section at the end of each subtopic, where there were some basic questions which should be attempted. Additionally there are problem sheets for each section with more difficult, exam and assignment style questions which can be used as revision.

Tutorials

There are two tutorials a week for this subject, both which should be attended. Similar to other mathematics tutorials, there is a strong focus on group problem solving using Miro and Zoom. I found attending the tutorial to be a useful introduction to the level of understanding that was expected of the concepts. The tutorial questions have more of a focus on investigating different applications of the concepts rather than straight proofs, which was slightly different to the problem sheet and the exam, however being able to manipulated the concepts developed my understanding.

The tutors also were very useful in properly explaining the answers after giving the questions a go. The answers given on the LMS after the tutorials were quite limited so I strongly encourage going to tutorials. I found the time spent thinking about the concepts to be invaluable in my understanding, especially for a concept heavy subject like this one.

Assignments

The assignments for this subject were slightly different to typical maths assignments. All assignments had a short reading at the beginning and required a short (less than 250 word) response on what you found interesting or peculiar about the reading. The readings were on concepts which I would not otherwise have considered and not directly related to the topics. For example, one reading was about how computers are being used to come up with conjectures and then proving them without human input. This would only make up a small proportion of the marks of the assignment.

The majority of the marks are allocated to typical maths assignment style questions. A lot of the assignment questions were similar to the tutorials in that they were investigative in nature. Each part tended to build on the previous part to reach a final conclusion. The difficulty is similar to the tutorials and the questions are usually quite obscure so stack exchange and google are not that useful.

There is also an optional (non-marked) section of the assignment which encourages you to learn how to typeset with LaTeX. This is a useful skill to develop if you want your assignments to look more professional.

End-of-semester exam

The final exam was notable in that it covered most of the areas that were taught in some depth. All the definitions and theorems that were in the notes were also provided, which means that the notes sheet that you were allowed to bring could contain proof structures and concepts which you had difficulty with rather than straight definitions. The exam difficulty was similar to the tutorials and assignments with questions more similar to the problem sheets. The practice exam was very similar to the actual exam in terms of difficulty and the type of question.

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MGMT20001 Organisational Behaviour [SUM]

Exemption status	None
Lecturer(s)	Dr Joeri Mol
Weekly contact hours	2 × 1-hour lectures
	1 × 1-hour tutorial

Assessments		
	Active tutorial participation	10%
	Individual assignment	10%
	Individual case study report	30%
	3-hour end-of-semester exam	50%

Textbook recommendation	McShane et al. *Organisational Behaviour 6th Edition*.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2021 Summer Term

Comments

Organisation Behaviour goes into the different models of behaviour within organisations on both a micro and macro level. It utilises many relevant academic journals and past large company case studies to show the benefits and implications of the different models in real life. This subject was particularly interesting for me as I found that it was very applicable to the many different groups that I am involved with and gave me a better grasp of all the different factors that affect organisations.

Subject content

There are 12 lectures in total each on a different module:

1. Introduction to OB

Micro topics:

2. Contrasting Management Approaches
3. Perceptions, Attributions and Decision Making
4. Teams and Leadership
5. Values, Attitudes and Behaviour
6. Motivation in Organisations
7. Conflict & Negotiation

Macro topics:

8. Ethics
9. Organisational Change
10. Organisational Culture
11. Organisational Communication
12. Power and Influence

Lectures

Lectures were pre-recorded and uploaded on Lecture Capture on the Monday and Wednesday of each week. OB during the summer was a lot more fast-paced so it was necessary to stay on top of the lectures as the lectures released on Monday were covered in the tutorial on Tuesday and the lecture on Wednesday was covered in the tutorial on Thursday.

The lectures are relatively short at an hour long. However, in some weeks they would run overtime. The content in each lecture is very structured as shown in the subject content above being divided into micro and macro topics. The lecture slides were a very good revision tool for myself and the content on them comprised most of the pre-tutorial quizzes for the tutorial covering the micro topics.

Tutorials

Tutorials were held twice a week on Tuesdays and Thursdays with each having a pre-tutorial quiz due 8 am the morning of the tutorial.

Only tutorials 3-12 were assessed with their pre-tutorial quiz worth 0.4% each and tutorial attendance worth 0.6% each, totalling up to a maximum of 10%

The tutorials began with a quick recap of the previous lecture and the pre-tutorial quiz before being broken into breakout rooms to discuss the readings and tutorial questions that were posted on the LMS. My tutor utilised collaborative workspaces such as Miro Boards and screen sharing Word documents in individual breakrooms. Towards the end of the tutorial, the breakout rooms would close and there would be a discussion of the different prompts discussed within the breakout rooms.

The tutorials really helped my understanding and gave me the opportunity to apply the   theoretical concepts through group discussions. These quizzes and actual tutorials really helped me stay on top of the fast-paced summer subject. In order to better utilise these spaces, I would highly encourage students to take a proper attempt at the pre-tutorial quizzes and the case studies as much of the discussion hinges on the content in those.

Assignments

Both assignments focussed on micro-organisational topics, whereas the exam focused on macro-organisational topics.

The first assignment was an individual essay worth 10% with a word limit of 1,000 words. It was given out in the first lecture and due at the end of the second week. With this assignment, there was a study skill session and many academic essay writing tips that were very helpful and specific to the essay. These were very helpful in finding academic journals and referencing them in APA style. This essay was only worth 10% but served as a great learning tool for the second assignment.

The second assignment was an individual case study report worth 30% with a word limit of 1,500 words. This assignment was released straight after the first assignment's due date, at the end of the second week, and was due at the end of week 5. I highly recommend starting this assignment earlier rather than leaving it to the last minute. as researching and finding academic journals, drafting, as well as finalising the case study report takes a considerable amount of time. Furthermore, ensure that you utilise the feedback that you received from the first assignment.

End-of-semester exam

The end of semester exam is worth 50% of your overall grade. It is typically two hours but to accommodate for the virtual nature, students were given three hours to complete the exam. The exam consisted of four long response questions based on a single case study from the tutorials covering macro topics. In this year's exam, it was Apple. The first question was based on a micro-organisational topic while the other three were based on a single macro-organisational topic. All the case studies and organisational topics were given throughout the semester, so I highly encourage you to stay on top of your readings and apply new concepts learnt to previous case studies. The questions were all equally weighted so time management is crucial.

Third-Year Subjects

Contents

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ACTL30001 Actuarial Modelling I

Exemption status	CS2 *Risk Modelling and Survival Analysis*, in conjunction with ACTL30002 *Actuarial Modelling II* and ACTL30007 *Actuarial Modelling III*. Satisfactory performance across all three subjects is required.
Lecturer(s)	Prof Shuanming Li
Weekly contact hours	2 $\times$ 1-hour lectures 1 $\times$ 1-hour tutorial
Assessments	Individual assignment due in Week 5 15% Individual assignment due in Week 11 15% 3-hour end-of-semester exam 70%
Textbook recommendation	None
Lecture capture	Full (both audio and video)
Year and semester reviewed	2021 Semester 1

Comments

This subject focuses on modelling techniques in life insurance, covering estimation procedures for lifetime distributions, survival model concepts and actuarial applications of Markov processes. I really enjoyed this subject as it was heavily related to probability and featured extensions of many concepts previously learned in ACTL10001 Introduction to Actuarial Studies and ACTL20003 Stochastic Techniques in Insurance. Professor Shuanming made utmost effort to simplify challenging concepts as he provided additional handouts highlighting the key concepts in each module. Overall, the subject was challenging but at the same time engaging, well-structured and the topics were linked together implicitly or explicitly.

Subject content

- **Unit 1: Survival Models and Life Tables**:
  - introduces actuarial notation for the probability a life aged "x" will survive any given number of years. Explores mortality rates and assumptions on fractional age.
- **Unit 2: Non-parametric Estimations of Survival Functions**:
  - delves into how to estimate the probability that a life will survive a given number of years, given censored and/or non-censored data, using a likelihood function. Introduces the Kaplan-Meier and Nelson-Aalen estimation methods.
- **Unit 3: Parametric Mortality Models**:
  - estimates mortality rates using three models of mortality: the two-state Markov model, Binomial model and Poisson model, and studies each of their pros and cons.
- **Unit 4: Continuous-time Markov process and applications**:
  - The heftiest of units in this subject. Looks into different models that are being used for human lives. For example, in a permanent disability model (lives can either be "Healthy", "Permanently Disabled" or "Dead"), looks at the probabilities of transitioning from one state to another.
- **Unit 5: Discrete-time Markov chains**:
  - Similar to high school Markov chains, where the probability of transitioning from one state to another follows discrete-time and is represented by a transition matrix. This unit also encompasses first-step analysis and some basic simulation by hand. This was my favourite unit, because it was intuitive and comparatively easy!

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Lectures

The lecture notes were quite comprehensive, well-structured and a perfect blend of key concepts, proofs and applications. Shuanming recorded and uploaded both lectures on Canvas well in advance throughout the semester (in most cases, on the prior weekend!). I think this was really beneficial in terms of time management, particularly for students located overseas. He also provided concise preliminary notes and supplementary handouts which made some difficult concepts easier to understand. Sometimes, I even found hints on assignments and exam type questions in the lectures. This was my third and final subject under Professor Shuanming and I will miss his lectures and consultations.

Tutorials

The weekly tutorials were delivered on zoom and uploaded on Canvas later. Attempting (or at least previewing) the questions before the tutorial is a great way to check conceptual understanding. Exam and assignment questions were like the tutorial questions; completing all questions gives a huge advantage for the completion of the exam (particularly the MCQs).

I tried my best to attend the tutorials as it motivated me to stay up-to-date with lectures. However, in rare cases, I would listen to Shuanming's recorded tutorials. The official solutions (uploaded on canvas later in the week) were easy to understand but I mostly referred to my tutor's solutions, as they included additional summary notes.

Assignments

There were two individual assignments, with one due mid-semester and the other towards the end of the semester. The questions were quite similar to the tutorial problems. As stated earlier, Shuanming would occasionally give hints for the challenging assignment questions in the lecture recordings. The second assignment was slightly easier than the first one. Both assignments required a decent amount of Excel or R software applications, which made them more enjoyable. Overall, I performed quite well in the assignments.

End-of-semester exam

The final exam was an online, open-book exam. In terms of structure, it was quite similar to the practice exam, with a decent amount of MCQs, True/False, short answer and long answer questions. However, in terms of difficulty, it was more challenging. Although we had an additional 30 minutes due to this year's online format and I made the most out of the time I had, I still almost ran out of time as I failed to prioritise the questions and did not manage my time well. I would highly recommend utilising any online resource to save your time on calculations, such as using matrix and simultaneous equation solvers, Excel, and R.

ACTL30002 Actuarial Modelling II

Exemption status	CS2 *Risk Modelling and Survival Analysis*, in conjunction with ACTL30001 *Actuarial Modelling I* and ACTL30007 *Actuarial Modelling III*. Satisfactory performance across all three subjects is required.
Lecturer(s)	Dr Ping Chen
Weekly contact hours	$2 \times$ 1-hour lectures $1 \times$ 1-hour tutorial
Assessments	Individual assignment 1 (Week 8) 15% Individual assignment 2 (Week 12) 15% 3.5-hour end-of-semester exam 70%
Textbook recommendation	ACTL30002 Workbook, available on Canvas. It includes lecture slides, tutorial problems, progress check questions, a specimen Exam paper (the solution is unavailable) and statistical tables. √ Having a physical workbook is highly recommended as it provides you with better experience tracking the progress of your learning.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2021 Semester 1

Comments

The aim of this subject is to provide a foundation in mathematical and statistical modelling techniques that are relevant in actuarial studies. The techniques studied include methods of estimating mortality rates and assessing their adherence to data and smoothness, as well as techniques for mortality projections. In addition, elementary principles of machine learning with applications to mortality modelling are covered.

Based on the assignments and the end-of-semester exam, I found this subject a lot more manageable compared to the other two CS2 exemption subjects, Actuarial Modelling I and Actuarial Modelling III.

Subject content

1. **Unit One – Exposed to Risk Methods (Week 1–Week 3)**
   The first three weeks of this subject consider the estimation of mortality rates from crude data. Actuaries are able to use population mortality rates to build actuarial models for a variety of insurance products (e.g. life insurance contracts), or other needs such as pricing or reserving.

2. **Unit Two – Hypothesis Testing (Week 4–Week 5)**
   This unit introduces six different types of hypothesis testing methods: Chi-Squared Test, Individual Standardised Deviation Test, Cumulative Deviation Test, Signs Test, Runs Test/ Stevens' Test and Serial Correlations Test.

3. **Unit Three – Methods of Graduation (Week 6–Week 8)**
   Graduation is defined as the process of smoothing mortality rates. Major graduation methods introduced in this unit are the Whittaker-Henderson Graduation Method, Graphical Method of Graduation, the Univariate (delta) Method, Graduation by Mathematical Formula, Graduation by Reference to a Standard Table and Graduation Using Cubic Splines.

4. **Unit Four – Mortality Projection and Machine Learning (Week 9–Week 12)**

Unit Four contains two parts: the first concerning mortality projection and the second concerning machine learning. With the advent of computers and voluminous data, techniques employed in mortality projections have increased in sophistication, making use of stochastic models and machine learning techniques.

Overall, the content of the subject is manageable in terms of difficulty. I found Unit One is the most difficult part of the subject as the exercises on different types of rate intervals always caused a headache. Extra care may be needed when studying this unit.

Lectures

I would describe Ping's lecture delivery style as clear and organised. However, she spoke at a slower pace and tended to go overtime. As lectures were pre-recorded, I watched most of her lectures at 1.5 or 1.75 speed. In addition, I found her lecture slides difficult to read when doing revision. One helpful tip is to write your own summary notes for each unit instead of relying on the lecture notes.

For more challenging topics, Ping provided supplementary notes for a better understanding of the content. Intermediate Excel and R knowledge is required to excel in this subject. Rest assured as detailed explanations on Excel implications such as Excel Solver and Goal Seek are covered in the lectures.

Tutorials

Tutorials occurred on a weekly basis, commencing from the second week of the semester. It is highly recommended to attempt all of the questions before attending tutorials as the tutorial sheets were not lengthy. Most of the questions were easy to approach and test your basic understanding of the subject materials. A tutorial recording was also provided by the end of the week which was useful for revision. They provided a better understanding of concepts and their Excel application.

Assignments

Assignments one and two were individual assignments with 30 marks and 15 marks respectively. Both had two questions that tested a deep understanding of the subject materials in their relevant units.

The first assignment covers units one and two. The question relating to unit one is particularly challenging as it tests your understanding of the central exposed to risk methods. I suggest taking your time to understand the concept of rate intervals and seek clarification of the lecture materials when necessary. The second question involves working extensively with an Excel spreadsheet in order to obtain answers.

The second assignment covers units two and three. This assignment was straightforward and easier compared to the first assignment; I was able to finish it in a day. Implementation of Excel is used for this assignment.

End-of-semester exam

The final exam was in the format of "Quizzes" in Canvas. Students had 3.5 hours to complete the exam. Only PDF files are accepted which means students have to make time for scanning and uploading answers.

A practice exam was made available to familiarise ourselves with different types of long-answer questions. In the practice exam, R and Excel were used extensively to be able to obtain answers. Overall, the final exam has a similar format with 11 questions and a total of 70 marks. It has a slightly higher level of difficulty but no extensive use of Excel and R. Personally, the most challenging question is the conversion of rate intervals in Unit One.

ACTL30003 Contingencies

Exemption status	CM1 *Actuarial Mathematics I*, in conjunction with ACTL20001 *Introductory Financial Mathematics*. Satisfactory performance across both subjects is required.
Lecturer(s)	Dr Rui Zhou
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour tutorial
Assessments	Individual Assignment 1, due in Week 5 15% Individual Assignment 2, due in Week 10 15% End-of Semester Exam (Hurdle) 70%
Textbook recommendation	Dickson, D., Hardy, M., & Waters, H., 2020 (or 2013) *Actuarial Mathematics For Life Contingent Risks.* 3rd (or 2nd) edition. New York: Cambridge University Press. Rui provided a list of selected questions from this textbook as further exercises but neither official answers nor detailed explanations were provided on Canvas. Personally, I found that keeping up to date with tutorials was sufficient. Dickson, D., Hardy, M., & Waters, H., 2020 (or 2013). *Solutions Manual for Actuarial Mathematics for Life Contingent Risks*. 3rd (or 2nd) edition. New York: Cambridge University Press. Both textbooks serve as additional reading materials. ✓ I recommend you have a read when you find certain topics either interesting or confusing.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2021 Semester 2

Overall Comments

Despite being a very challenging and content-heavy subject, students who love life insurance concepts will really appreciate the beauty of this subject. Stepping away from tedious proofs, the subject promotes conceptual and application-based learning. The subject is well-structured and covers a wide spectrum of linked topics ranging from pricing of single/joint life insurance to reserving and multiple decrement models. I really enjoyed the subject as it was related to probability theory and featured extensions of many concepts previously learned in ACTL20001 Introductory Financial Mathematics and ACTL30001 Actuarial Modelling 1. A/Prof Rui Zhou made utmost effort to simplify challenging concepts using the timeline method and intuitive explanations. I strongly recommend the students to invest time in building a solid foundation of concepts instead of memorising formulae and equations. It is the only efficient way to tackle complicated exam questions under time pressure. My golden rule was to be consistent throughout the semester and to seek guidance from tutors and the lecturer in consultations. Like many actuarial subjects, last minute effort will not help.

Subject Content

Overall, this subject heavily relies on the knowledge of probability theory and financial mathematics. It mainly provides actuarial techniques for calculating premiums and policy values for life insurances and life annuities.

- **Select Life Table, Insurance Benefits and Annuities**
  Introduces underwriting 'selection effect' concept to differentiate between insured lives and standard population. To reflect this in practice, select life tables are constructed following similar results used in deriving the ultimate mortality table. This concept will be applied throughout the semester.

Teaches core techniques of calculating mean and variance traditional insurance and annuity benefits (whole life, term, etc.). These techniques involve first principles, recursive relationships and interconnection of various insurance products. To make things more challenging, a lot of notation is introduced. However, by the end of semester, students will find it very easy to identify and interpret them.

- **Premium calculation and Policy valuation**

  The last topic prepared us to calculate premiums using the principle of equivalence. Some applications on with-profit insurance and extensions with extra risks were included afterwards. After premium calculation, the teaching flowed into policy valuation. We learnt profit analysis on an annual basis and Thiele's Different Equation under the context of policy value.

- **Multiple state models**

  This part started with a review of the Markov process learnt in *Actuarial Modelling I*. Topics in multiple state models are extensions of materials in Week 4 to Week 6 where the alive-dead model was used. Several other famous multiple state models were discussed.

- **Joint Life Theory**

  This was the most interesting but challenging topic for me in this subject. Further to the standard notations in Week 1 to Week 3, functions on joint life, last survivor and contingent life were introduced. The difficulty came from questions that applied these functions. I found drawing timelines to understand the relationships between two lives before writing down formulae is the best approach to tackle these questions.

- **Multiple Decrement Model**

  The multiple decrement model is a special case of the multi-state model where there is one alive state and n absorbing states (not necessarily a dead state). Knowledge on constructing relationships between the single decrement model and multiple decrement model, and finding probabilities under fractional age assumptions were discussed.

- **Emerging costs and Unit-linked Insurance**

  So far in the course, we had focused on determining the EPV of cash flow series. This topic mainly talked about how to project the cash flow emerging from a contract in each time period for pricing, reserving and profit testing.

Lectures

The lecture notes were concise, well-structured and a perfect blend of key concepts, proofs and applications. Rui is very organised and sent us an email each week beforehand summarising topics. She recorded and uploaded both lectures on canvas well in advance throughout the semester. I think this was really beneficial in terms of time management, particularly for students located overseas. In terms of lecture consultations, I really enjoyed attending all of them as she would make concepts more clear. Overall, I believe that Rui did an amazing job in teaching such an extensive subject within 12 weeks and it doesn't get any better.

Tutorials

The weekly tutorial was delivered on zoom and uploaded on canvas later. Attempting (or at least previewing) the questions before the tutorial is a great way to check conceptual understanding. Exam and assignment questions were like the tutorial questions. I tried my best to attend the tutorials as it motivated me to stay up-to-date with lectures. The official solutions (uploaded on canvas later in the week) were easy to understand but I mostly referred to my tutor's solutions as they also included summary notes. Both tutors in my cohort were very good at explaining intuitions behind formulae.

Assignments

There were two individual assignments. Each consisted of six or seven long answer questions. In terms of difficulty, both assignments were manageable and on a comparative scale – easier than Prof. Shuanming's ACTL30001 Actuarial Modelling 1 assignments. Rui likes to make assignments available before the knowledge required for the majority of questions has even been taught yet. As such, both assignments included questions that were learnt within the same week of the due date. Having good time management skills is essential and you should not leave all questions until a few days before the due date. In terms of content, the first assignment required extensive use of excel (in construction of annuity tables from scratch, etc.).

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Most questions in the second assignment were similar to tutorial questions and required handwritten answers. Overall, I performed quite well in the assignments.

End-of-semester Exam

The final exam was closed-book and zoom invigilated. Unlike usual 3 hour +30 min online exams, it was a 2-hour exam + 15 minutes reading time. We were allowed two A4 sheets of paper with notes, handwritten and/or typed, on both sides. I tried to keep it concise with all the main concepts (as I did in previous Probability and Statistics exams). However, I had no time to look at them during the exam. In terms of structure, there were 8 questions (mix of long and short answer!) worth 50 marks in total. There were no MCQ and T/F questions. Each question required a decent amount of concept application and calculations. In terms of difficulty, the exam was very challenging. The main issue was time constraint with a lot of life table calculations. Two hour exam with 8 questions meant there is no time to think. So, it's either you know how to solve the question or you do not. Most of the people in my cohort had the same experience. I strongly recommend the student to -

1. Practice - till you are comfortable solving questions under time pressure.
2. Have a back-up plan – Will you skip the challenging questions and focus on the ones you know or will you try to attempt every question?
3. Utilise the reading time well to get the answer to the above question.

Students who achieve these goals will perform well and stand out in the cohort. Good luck!

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ACTL30004 Actuarial Statistics

Exemption status	CS1 *Actuarial Statistics I*, in conjunction with MAST20004 *Probability* and MAST20005 *Statistics*. Satisfactory performance across all three subjects is required.
Lecturer(s)	Dr Enrique Calderín
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour tutorial

Assessments

Individual Assignment 1	15%
Individual Assignment 2	15%
End-of-semester exam (hurdle)	70%

Textbook recommendation	**Prescribed Reading** *Actuarial Statistics* Reading The prescribed reading is pretty much the same as the lecture materials with additional background information and an appendix. I read it on a weekly basis before lectures to give myself an overview of each week's material. **Supplementary Reading** • Frees, E. W., Derrig, R. A. and Meyers, G. (eds) (2014) *Predictive Modeling Applications in Actuarial Science.* Cambridge: Cambridge University Press (International Series on Actuarial Science). • Boland, P., 2007. *Statistical And Probabilistic Methods In Actuarial Science.* 1st ed. CRC Press. • De Jong, P. and Heller, G., 2013. *Generalized Linear Models For Insurance Data*. Cambrigde: Cambridge University Press.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2021 Semester 2

Overall Comments

This subject covers the basics of advanced linear regression analysis. It starts off with measures of correlation, principal component analysis and multiple linear regression. The second half of the semester focuses on generalised linear models and credibility theory. A few of the earlier contents were already touched upon in my previous subject, such as Statistics and Actuarial Analytics and Data I so personally, I found the latter topics more challenging. This subject also involves a heavy use of R.

Subject Content

- **Unit One — Exploratory Data Analysis with** R **(W1–W2)**
  Exploratory Data Analysis is a technique for analysing datasets to summarise their main features, often with visual methods. The main goal of exploratory data analysis is for observing what the data can tell us beyond the formal

modelling or hypothesis testing. The use of statistical software is crucial to perform the analysis. The first part of this chapter gives an introduction to exploratory Data Analysis and the second part discusses different methods of multivariate exploratory data analysis and their implementation in R.

- **Unit Two — Properties Estimation and Estimates (W3–W4)**

   Most of the knowledge covered in this unit regarding MLE, simulation and introduction of bootstrap method will be a revision of ideas that you have already met in *Statistics*, *Actuarial Modelling I* and *Actuarial Analytics and Data I*, respectively. There will, however, be some new material related to the use of the bootstrap method to estimate the properties of an estimator.

- **Unit Three — Multiple Linear Regression (W4–W6)**

   This unit introduces linear regression in the case of several explanatory variables. Many of the results derived for the simple linear regression extend directly including goodness-of-fit measures and inference. Further materials on residual analysis, multicollinearity, variable selection procedures and some special explanatory variables are discussed afterwards.

- **Unit Four — Generalised Linear Models (W6–W9)**

   GLM is the most important topic in this subject and serves as an extension of the multiple regression models where the assumption of a normally distributed response variable is no longer needed. This is particularly important in actuarial work where the data very often do not have a normal distribution and this method is often used in general insurance for determining premiums. This unit aims to provide an in-depth understanding and applications of the exponential family of probability distributions and the parameter estimation procedure.

- **Unit Five — Credibility Theory (W9-W12)**

   Credibility theory can be considered to calculate premiums or to estimate claim frequencies in general insurance. The mechanism to design a way of combining the experience of the group with the experience of the individual risk to calculate a better premium can be formulated in an either frequentist or Bayesian statistical settings. The Bayesian statistical method is often preferred and is a focus of this chapter due to its flexibility to recognise more than one source of randomness via sampling and prior information.

Lectures

Enrique is a great lecturer who explains answers clearly for the questions you have in the consultations and he often provides you with the background knowledge required first and then guides you through the questions patiently. For most of the time, Enrique liked to read off slides firstly and then provided further explanations on concepts and deviations. Admittedly, you may find that it will take you a few weeks to adapt to his accent and his way of teaching.

Tutorials

The tutorial questions are of the right length and the right difficulty. The first tutorial was revision of some concepts in previous subjects, but latter ones relate closely to the course and lectures. To perform well in the exam, I highly recommend using the tutorial problems as a good resource for revision since one or two questions in this year's final exam are closely related to some of the tutorial questions.

Assignments

The two assignments involve the heavy use of R and you need to submit a pdf file that includes sufficient R codes, so I used R Markdown. Even though the concept tested is not difficult, I personally found the making criteria provided to us not very clear so I lost some unnecessary marks. My advice is to go back to the lectures and try to link as much concept as possible and include it in your assignment.

End-of-semester Exam

This year, the final exam was manageable in terms of difficulty compared to the other two core subjects offered in the same semester. There were a specimen paper and a practice exam available on Canvas. Due to the curriculum change, the specimen paper became less valuable as only three questions in the paper examined knowledge learnt in this subject. The practice exam, however, reflected the styles and difficulties of the questions in the actual exam very well and I suggest you use it as guidance.

ACTL30006 Intermediate Financial Mathematics

Exemption status	CM2 *Financial Engineering and Loss Reserving*, in conjunction with ACTL20004 *Topics in Actuarial Studies* and ACTL40004 *Advanced Financial Mathematics*. Satisfactory performance across all three subjects' end-of-semester exam is required.
Lecturer(s)	Dr Ping Chen
Weekly contact hours	2 $\times$ 1-hour lectures 1 $\times$ 1-hour tutorial
Assessments	2 $\times$ Individual assignments 2 30% 3-hour end-of-semester exam 70%
Textbook recommendation	Prescribed References: Joshi, M.S. and Paterson, J.M., 2013. *Introduction to mathematical portfolio theory*. Cambridge University Press. Supplementary Readings: Goetzmann, W.N., Brown, S.J., Gruber, M.J. and Elton, E.J., 2014. *Modern portfolio theory and investment analysis*. John Wiley & Sons, 237.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2020 Semester 2

Overall Comments

This subject takes the ACTL20001 *Introductory Financial Mathematics* one step further. Intermediate Financial Mathematics aims to explain the mathematics underlying Modern Portfolio Theory. It examines the fundamental question of how to divide an investment amongst many possible investment opportunities under the assumption that those investments are correctly priced. One thing you should consistently keep in mind throughout the semester is no single model is flawless. A large part of the content discussed was how to conduct experiments and analyse the downsides of the models.

Personally, the concepts were easy to understand as they were well-structured and based on different assumptions of investments and investors. Most of the material in this subject served as the background for further studies. The most rewarding part for me was the process of developing the intuition of financial models using mathematical knowledge learnt in previous subjects.

Subject Content

- **Lecture 1**: Introduction to Modern Portfolio Theory

  The objective of the modern portfolio theory is to maximise the risk-return trade-off when investing in the markets through the use of mathematical tools. Notably, in financial mathematics, we generally focused on the future rather than the past. Therefore, the expected return is the centre of focus.

- **Lectures 2–5**: Mean-variance Theory

  The mean-variance theory provides a way of choosing a combination of assets based on the idea that investors only care about mean-variance efficiency. This topic guides you through the steps of constructing an opportunity set and finding efficient frontier and typical portfolios.

- **Lectures 6–9**: Single-factor model and Multi-factor model

  These two models simplify the mean-variance theory via relating assets to the market portfolio, which largely reduces the data required in the analysis. I found that it helped to understand the topic by treating the model as a financial application of the linear regression model learnt in *Actuarial Analytics and Data I* and *Actuarial Statistics*.

- **Lectures 10–13**: Expected Utility Theory

  Expected Utility Theory helps to choose portfolios by giving assumptions on risk preferences. This is in compar-

ison to the mean-variance analysis, which does not show which portfolio to hold, which instead reduces the set of investments worth considering.

- **Lecture 14**: Geometric Means

   Given the previous two criteria in portfolio selection (mean-variance criteria and expected utility theory), geometric means is another method used for long-time (lifetime) growth of a portfolio.

- **Lecture 15**: Stochastic Dominance

   The three criteria derived so far require very strong assumptions on the investor. Here, Stochastic Dominance requires strong assumptions on the investments, but only very weak assumptions on the investor.

- **Lectures 16–17**: Capital Pricing Asset Model (CAPM)

   Depending on the investor's analysing ability, the investment pool varies from investor to investor. The CAPM develops a simple relationship between the expected return of an asset and its covariance with the market portfolio by making an unrealistic assumption that investors have identical analysing abilities.

- **Lectures 18–19**: Arbitrage Pricing Theory (APT)

   APT provides analysis based on the multiple factor model but with no diversifiable risk involved.

- **Lecture 20**: Efficiency and Rationality

   This lecture examines three different forms of market efficiency. It is one of the most theoretical topics in the subject.

- **Lectures 21–22**: Risk Measures — Value at Risk (VaR)

   to this point, the variance has been used as the principal measure of risk. Value at Risk is another measure of risk that compensates for some disadvantages of the variance. For example, the variance penalises upside variance as well as down-size variance.

Lectures

The lecture slides were very clear and connected. Ping explained abstract concepts extremely well, so I found that not much time was needed to digest concepts after attending lectures. Therefore, I highly recommend that you should keep up to date with the lectures to make your learning enjoyable. In terms of content, lectures were theory based with one to two examples after each topic.

Tutorials

Tutorial questions were straight-forward, with no complicated calculations or proofs required. If a consistent effort is applied throughout the semester (by watching lectures), the level of difficulty should not be a concern. However, I found attending tutorials helpful in terms of consolidating my understanding, as my tutor provided concise recaps of the previous week's content. I do suggest that you attempt questions prior to attending tutorials as then you will find tutorials to be much easier to follow.

Assignments

Both assignments were Excel-based and intended to mimic a real-life scenario you may encounter at work. The first assignment examined the knowledge of the mean-variance theory with five assets and required a spreadsheet model built using Excel. In the second assignment, the task was to estimate the CAPM betas of four self-selected stocks and also write an 800 words commentary essay.

End-of-semester Exam

There were five multiple-choice questions and seven file-uploading questions, examining all topics in the course. Personally, the difficulty level of the exam was unexpected, given the straightforward nature of the tutorial questions. A few questions examined the understanding of definitions and intuition behind models. For the most part, the final exam had a similar difficulty to the practice exam, and a similar format to the tutorial questions — with just extra layer of complexity.

ACTL30007 Actuarial Modelling III

Exemption status	CS2 *Risk Modelling and Survival Analysis*, in conjunction with ACTL30001 *Actuarial Modelling I* and ACTL30002 *Actuarial Modelling II*. Satisfactory performance across all three subjects is required.
Lecturer(s)	Prof Benjamin Avanzi
Weekly contact hours	2 $\times$ 1-hour lecture 1 $\times$ 1-hour tutorial
Assessments	Individual assignment due in Week 6 15% Individual assignment due in Week 12 15% 3-hour end-of-semester exam 70%
Textbook recommendation	Multiple textbooks were recommended for different parts of the course (refer to **Subject Content**):

- **[MW]**: Wuthrich, Mario V., *Non-Life Insurance: Mathematics & Statistics* (January 7, 2020)

  √ Highly recommended as there are some proofs worth reading that are not discussed in the lectures.
- **[FV]**: Frees, E.W. and Valdez, E.A. (1998), *Understanding Relationships Using Copulas*, North American Actuarial Journal 2:1, pp. 1-25

  X Not necessary, but it is still a good resource
- **[RS]**: Shumway, Robert H., Stoffer, David S. (2017) *Time Series Analysis and Its Applications With R Examples*, Springer

  The lecture materials are comprehensive; X do not recommend.

Lecture capture	Full (both audio and video)
Year and semester reviewed	2021 Semester 1

Subject content

Essentially, the course is constituted of two main parts with 9 modules in total:

Part 1: Random Variables and Distributions for Risk Modelling

This part studies the aggregate sum S of losses of a portfolio of contracts or a contract over a certain period. Three of the different ways that S is modelled is taught in the first half of the subject:

- **Weeks 1–2**: Collective Risk Modelling **[MW]**
- **Weeks 3–4**: Individual Claim Size Modelling **[MW]**
- **Week 6**: Approximations for Compound Distributions **[MW]**

The next two selected topics focus on demonstrating how the copulas function represents the dependent structure of its joint function with impacts of the marginal distribution removed and how to analyse extreme values of a dataset using Generalised Extreme Value distribution and Generalised Pareto distribution, respectively.

- **Week 7**: Copulas **[FV]**
- **Week 8**: Extreme Value Theory **[FV]**

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Part 2: Time Series

Time series refers to the systematic approach by which one goes about answering the mathematical and statistical questions posed by these time correlations. The primary objective is to develop mathematical models that provide plausible descriptions for sample data that are connected at adjacent time periods.

- **Week 9**: Characteristics of Time Series **[RS]**
- **Week 10**: Time Series Regression and Exploratory Data Analysis **[RS]**
- **Weeks 11–12**: ARIMA Models **[RS]**

As remarkably emphasised by the lecturer, this subject requires a deep understanding of concepts. Rote learning and memorising concepts will not suffice. Therefore, I would recommend taking time after classes to digest concepts and make sure you can apply knowledge to not only tutorial exercises but also real-life problems that demonstrate your understanding. Consultation is always a good place to go if you find topics confusing,

Time series is the most interesting part for me in this subject. Being able to correctly analyse relationships between two time series and demonstrate potential stationarity of time series always make me satisfied.

Lectures

Benjamin goes through the lectures module by module and separates them by each subtopic. The lecture recordings are provided in a similar manner, which I personally found very helpful, as it made it much easier to navigate through different topics during revision. Whilst the slides were self-explanatory in terms of the theory taught, Benjamin's interpretation of the different diagrams/graphs and derivations were only available through the recordings.

Tutorials

Unlike your other actuarial tutorials, the questions for ACTL30007 are not provided in a weekly manner, but rather on a module basis. This structure confused many students at the beginning of the semester, but we, as all do, adapt. What surprised many of the students was the sheer amount of the questions included in a single week's tutorial. Tutors hence could not always go through the entire set of questions and instead selected a few questions to cover based on difficulty, importance and the students' needs. As if structured to compensate for the lack of time spent in tutorials covering the questions, the provided solutions were more detailed compared to other subjects. It also included full scripts of R codes for questions which required its usage.

Assignments

The assignment, as mentioned previously, was arguably the most unique and least guided one I have experienced. Students were given a scenario and a large set of claims data, for which they were asked to observe, analyse, fit a model, and finally present the process and conclusion in a case analysis-style format as a 5-minute video interview. A mistake that many students made (including myself) was focusing too much on trying to find the "perfect fit" and describing every single analysis that took place. Should I have the chance to re-attempt the assignment, I would first give myself plenty of time to plan out the "presentation" aspect of the assignment, and take a rather holistic approach, honestly stating any limitations of my analysis as I would in a real interview.

End-of-semester exam

The exam, like many other online exams, was a 2-in-3-hour exam, taking the same format as the mid semester test. The final exam also encompassed questions requiring an extensive use of R, of which 18 out of 60 marks were designated to. Thankfully, Benjamin provided a detailed break-down of the mark distribution for the exam, which was quite helpful for allocating limited revision time across the different units. One difficulty many students faced was the multiple answer questions, (MAQ, not MCQ), where you are asked to choose correct answers out of 4 options, of which none or all could be correct. As every incorrect choice costs a mark, I suggest being very prudent when answering the MAQ and only selecting the options you are 100% sure of to reduce the risk of losing any marks. That is, however, unless you claim to be less risk-averse and wish to go for the chance of earning an extra mark at the cost of possibly losing one.

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ACTL30008 Actuarial Analytics and Data I

Exemption status	Not an exemption subject, but it is a prerequisite for ACTL40012 *Actuarial Analytics and Data II* (DAP *Data Analytics Principles*)
Lecturer(s)	A/Prof Xuyuan (Shane) Wu
Weekly contact hours	2 × 1-hour lectures
	1 × 1-hour Computer Lab
Assessments	Group assignment due in Week 6 15%
	Group assignment due in Week 12 15%
	Take-home end-of-semester exam 70%
Textbook recommendation	James, G., Witten, D., Hastie, T. and Tibshirani, R., 2017. *An Introduction To Statistical Learning*. Springer.
	This textbook is essential as the subject is heavily based on the textbook and the resources provided on the textbook website. It is ✓ highly recommended to have a preview of this book before taking the course as you will get a clear and comprehensive overview of the subject.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2021 Semester 1

Comments

This subject introduces the basic statistical learning methods as well as their applications in R. It is not an exemption subject but it forms a solid foundation for the exemption subject ACTL40012.

In terms of difficulty, it is on the easier side compared with AM1, AM2 and AM3. I enjoyed the practical aspect of this subject. However, the practical aspects made it challenging for me, since it was easy to apply a model but much more difficult to understand that model and how it would suit or not suit a particular dataset.

This subject is heavily R based. It starts off with the R fundamentals and gradually gets more in-depth. As someone who has never taken a computing subject before, I was still quite comfortable with the use of R in this subject.

Subject content

1. **Overview of Statistical Learning**:
   - This unit introduces the concept of supervised learning (covers Unit 2 to Unit 7) and unsupervised learning (covers Unit 8). It is relatively easy, but make sure that you get a good grasp on concepts such as classification vs regression, bias-variance trade-off, training MSE and test MSE. These theories are applied extensively in later units.
2. **Linear Regression**:
   - This unit builds on the knowledge of simple linear regression in MAST20005 and is an extension of linear regression. The KNN method discussed in this unit was quite intuitive for me.
3. **Resampling methods**:
   - Resampling methods involve repeatedly drawing samples from a training set and refitting a model of interest on each sample to obtain additional information about the fitted model.
4. **Subset Selection; shrinkage methods**:
   - Make sure you understand the algorithm of best subset selection, forward stepwise selection and backward stepwise selection, and also be able to implement them in R and interpret the results.

5. **Non-linear models**:
   - This unit covers several more complex non-linear models. I would recommend that you spend some extra time to understand how each of these models work and also be able to implement each of them in R.
6. **Classification methods**:
   - This unit shifts to the classification setting. It is important to understand which model suits different kinds of datasets, their pros and cons, as well as whether there are any assumptions made behind the models, for example, the assumptions behind linear discriminant analysis.
7. **Tree based methods**:
   - I found decision trees quite intuitive and fun to implement. Bagging, random forests and boosting are their more complex variations.
8. **Unsupervised learning methods**:
   - This unit takes a different statistical learning approach from the previous chapters and explores situations where the response variable is not present, for example, identifying shoppers with a similar interest. This unit was examinable as well.

Lectures

The lectures offer a detailed theoretical understanding of the various statistical learning methods, which forms the basis of practical applications in the computer labs. Shane explains the different models in detail, in a way that I found quite easy to comprehend. Additionally, the lecture material is extracted mostly from the textbook so the textbook offers more explanation. I also enjoyed the way that Shane structures the course in a very organised way and you will find it very easy to navigate on Canvas.

Tutorials

The tutorials focus on the R applications. I would highly recommend you to attend or watch all tutorials and implement the R code by yourself because both assignments and a large proportion of the final exam are based on coding in R.

Assignments

Both assignments are quite similar R-based group assignments. Tutorial material and the textbook are really good resources you can refer to. Generally speaking, decent marks can be achieved in both assignments.

End-of-semester exam

Since a larger proportion of the marks comes from R-based questions, the lab material is just as important as the lecture content in the preparation of your final exam. Apart from the lectures and tutorials, I would recommend using the after class exercises that Shane organises as a good resource.

It is not enough to just memorise the theory and code. A good way to tackle this subject would be to take a practical approach and try to understand how your model would perform in real life settings. Some example considerations that should be made are (please note that they are not limited to the below):

- What type of problem are you presented with?
- Why would you choose a particular model? Are there any other candidate models?
- What are the fundamental assumptions behind your model?
- How would you analyse your model fit based on the R codes?
- What are the advantages and disadvantages of your model?
- How could you improve your model?

Graduate Subjects

Contents

Equivalent Graduate Subjects

Subjects offered as part of the 150 credit MC-COMACTS *Master of Commerce (Actuarial Science)* program and the 200 credit MC-ACTSCI *Master of Actuarial Science* program (as well as it's variants) also allow graduate students to gain professional actuarial exemptions from the Actuaries Institute. Due to the overlap in content between these subjects and actuarial subjects offered as part of the B-COM *Bachelor of Commerce* and BH-COM *Honours* programs, we have listed graduate actuarial subjects with their undergraduate counterparts below.

Some of these graduate actuarial subjects will share the same lectures as their undergraduate counterparts, as in Table 1. Others will just contribute to the same exemption subject as their undergraduate counterparts (and hence have common content), as in Table 2. Whilst we continue to accumulate reviews from graduate-level actuarial subjects, the reviews for Masters subjects included in the *Actuarial Students' Society Subject Review* will also serve as an accurate reference of the content in the corresponding Honours subjects.

Please note the year and study period that each subject was reviewed in, as some subjects reviewed before 2019 will still refer to the old actuarial curriculum.

Table 1: Graduate and undergraduate actuarial subjects with common lectures

Graduate subject	Undergraduate subject
ACTL90003 Mathematics of Finance III	ACTL40004 Advanced Financial Mathematics I
ACTL90004 Insurance Risk Models	ACTL40002 Risk Theory I
ACTL90014 Insurance Risk Models II	ACTL40003 Risk Theory II
ACTL90010 Actuarial Practice And Control I	ACTL40006 Actuarial Practice and Control I
ACTL90011 Actuarial Practice and Control II	ACTL40007 Actuarial Practice and Control II
ACTL90016 Actuarial Science Research Report	ACTL40001 Actuarial Studies Research Essay
ACTL90013 Actuarial Studies Projects	ACTL40010 Actuarial Studies Projects Part 1
ACTL90013 Actuarial Studies Projects	ACTL40011 Actuarial Studies Projects Part 2

Table 2: Graduate and undergraduate actuarial subjects with common CP exemption subjects

	Graduate subject		Undergraduate subject
CM1	ACTL90001	Mathematics of Finance I	ACTL20001 Introductory Financial Mathematics
	ACTL90005	Life Contingencies	ACTL30003 Contingencies
CM2	ACTL90021	Topics in Insurance and Finance	ACTL20004 Topiocs in Actuarial Studies
	ACTL90002	Mathematics of Finance II	ACTL30006 Intermediate Financial Mathematics
	ACTL90003	Mathematics of Finance III	ACTL40004 Advanced Financial Mathematics
CS1	MAST20004	Probability	MAST20004 Probability
	MAST20005	Statistics	MAST20005 Statistics
	ACTL90008	Statistical Techniques in Insurance	ACTL30004 Actuarial Statistics
CS2	ACTL90006	Life Insurance Models I	ACTL30001 Actuarial Modelling I
	ACTL90007	Life Insurance Models II	ACTL30002 Actuarial Modelling II
	ACTL90020	General Insurance Modelling	ACTL30007 Actuarial Modelling III
CB1	ACCT90042	Accounting and Finance for Actuaries	ACCT10002 Introductory Financial Accounting
			FNCE10002 Principles of Finance
CB2	ACTL90022	Economics for Actuaries	ECON10004 Introductory Microeconomics
			ECON20001 Intermediate Macroeconomics
ACC	ACTL90010	Actuarial Practice And Control I	ACTL40006 Actuarial Practice and Control I
	ACTL90011	Actuarial Practice and Control II	ACTL40007 Actuarial Practice and Control II
DAP	ACTL90019	Data Analytics in Insurance II	ACTL40012 Actuarial Analytics and Data II

ACTL90001 Mathematics of Finance I

Exemption status	CM1 *Actuarial Mathematics I*, in conjunction with ACTL90005 *ACTL90005*. Satisfactory performance across both subjects is required.
Lecturer(s)	Dr Zhuo Jin
Weekly contact hours	2 × 1-hour lectures
	1 × 1-hour tutorial
Assessments	Group Excel assignment, due in Week 11 10%
	1-hour mid-semester test (topics 1-3) in Week 10 20%
	2-hour end-of-semester exam 70%
Textbook recommendation	Fitzherbert, R., & Pitt, D. (2012). *Compound Interest and its applications*. Melbourne, AU: University of Melbourne Custom Book Centre.
	√ I highly recommend buying this textbook.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2017 Semester 1

Comments

I loved this subject. This was my first subject from the actuarial studies department and it was the perfect introduction. Although there were many formulas to memorise, the applications later in the semester was interesting. In addition, many of the mathematical proofs were elegant and satisfying to see.

Subject Content

The content from this subject is equivalent to the undergraduate subjects ACTL20001 *Financial Mathematics I* and ACTL20002 *Financial Mathematics II*.

The first topic was an introduction to interest. We covered all the various types of interest such as simple interest, compound interest, nominal and effective rates of interest, the force of interest and varying interest rates.

The second chapter was on valuing cash flows. We looked at discrete and continuous annuities, increasing and decreasing payments and briefly covered solving equations of value.

The third chapter was on different loan types and their repayment schedules. We also covered financial evaluation of projects and focused on the five evaluation criteria; the net present value, the internal rate of return, the payback period, the discounted payback period and the accumulated profit of the project. This chapter also touched on allowing for inflation.

The fourth chapter was an overview on different investment classes such as shares, discount securities, fixed coupon securities, indexed bonds and derivatives. This section was very theory heavy compared to the other chapters that were more problem solving. We spent most of our time on futures, options and understanding long and short positions.

The fifth chapter was applying the formulae learnt in the first two chapters in asset markets. We looked at measuring investment performance by calculating the money weighted rate of return, time weighted rate of return, linked internal rate of return and Hardy's approximation. In this section, we also forayed into some more actuary specific content such as the idea of immunisation.

The final chapter was taking the content from previous chapters and applying probability theory. We looked at how to

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This review was previously published in the 2017 end-of-year edition of the *Actuarial Students' Society Subject Review*.

calculate expected present values and how to solve problems where the interest rate was a random variable. This chapter also introduced independent and dependent lognormal models.

Lectures

The lectures were all recorded with full audio and video. Zhuo provided notes on the LMS and during our lectures he used the document projector, often writing notes on the slides. He drew a number of diagrams to explain the different of annuity formulas. I found his lecture style extremely engaging and enjoyed his way of teaching. Zhou was also very receptive to students asking questions after class and always had time to go over concepts with individual students when needed.

Group Excel Assignment

For our spreadsheet assignment, we were required to evaluate four projects according to the five criteria introduced in chapter three. Not only did we have to provide our spreadsheet, but we also needed to write a summary explaining how our spreadsheet was set up and answer some short questions on which projects we would recommend.

This was a good introduction to Excel and to learning some graphing and linear interpolation techniques.

Mid-Semester Exam

The mid semester exam was an in class exam that covered chapters one to three. The questions were of a similar style to the ones from the textbook and the tutorials. There was nothing surprising or overly difficult on the MST.

For most of the cohort, the main problem was time management as the exam was long and everyone was writing until the last minute. There was basically no time to check over work or even to stop and think about the problem. The best way to do well in the exam was to do the questions from the tutorials and the textbook over and over again until the formulae were imprinted in your memory and the steps to follow for different types of questions was second nature. Before the mid semester exam, I had done all the questions from the book three times and so while I found the exam challenging, it was definitely doable and there were no surprises.

In our exam, there were no proof questions or deriving formulas from first principles. We were also provided with a small formula sheet with a limited number of formulae but I recommend memorising them rather than relying on the sheet.

End-of-Semester Exam

The end of year exam was a two hour exam in the last week of the exam period. The exam was incredibly long and covered everything from chapters one to six. There were a small number of theory questions but no proof or derivation questions. The questions in the exam were of a similar style to questions from the book as well as the few sample exams Zhuo provided.

Similar to the mid semester exam, there were no surprising questions, just a high volume of questions. While studying for the exam, it was tempting to look over the complex annuity questions that had increasing or decreasing payments and different interest rates and just say you know how to do it, but it was super important to actually sit down and do those long questions over and over again until the steps are engrained.

For the final exam, no cheat sheet was provided and it was important to keep all the formulas from the start of the semester in chapters one and two fresh in your mind.

Textbook

I highly recommend buying the textbook. It is relatively cheap and you can probably buy the textbook from a third year student. It covers the content in more depth than the lecture notes and has some background reading options as well.

Additional Study

For more practise questions, you can look at the past exams for CT1 from the Institute. A few students did that this semester for additional practise.

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End-of-Semester Exam

This subject was the perfect introduction to actuarial studies. The mathematics was elegant and there were plenty of problems to practise. Neither exams had any surprises but they were both extremely long. The content was interesting and well taught.

ACTL90002 Mathematics of Finance II

Exemption status	CM2 *Financial Engineering and Loss Reserving*, in conjunction with ACTL90003 *Mathematics of Finance III* and ACTL90021 *Topics in Insurance and Finance*. Satisfactory performance across all three subjects' end-of-semester exam is required.
Lecturer(s)	Dr Jane Joshi
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour tutorial
Assessments	Individual assignment, due in Week 11 10% 1-hour mid-semester test (topics 1-6) in Week 10 20% 2-hour end-of-semester exam 70%
Textbook recommendation	Joshi, M. S., & Paterson, J. M. (2013). *Introduction to Mathematical Portfolio Theory*. Cambridge, UK: Cambridge University Press. This is a required textbook, however there are a number of copies in the library available for short term loans.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2017 Semester 2

Comments

Overall Mathematics of Finance II was well taught and the content was interesting. The spreadsheet assignment was fun. The mid semester exam had nothing unexpected. The end of year exam was hell.

Subject Content

- Definition of risk and return
- Efficient Portfolios
- Portfolios with a risk-free asset
- Finding the efficient frontier
- Single-factor models
- Multi-factor models
- Introducing Utility
- Utility and risk aversion
- Foundations of utility theory
- Maximising long term growth
- Stochastic dominance
- Risk measures
- The Capital Asset Pricing Model
- The arbitrage pricing model
- Market efficiency and rationality
- Brownian motion and stock price models across time

Lectures

The lectures were all recorded with full audio and video. In the notes printed off the LMS, some sections were left blank for us to fill out during the lectures. Personally, I found the lecture pace slow but the content was well taught and explained

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This review was previously published in the 2017 end-of-year edition of the *Actuarial Students' Society Subject Review*.

clearly.

The first half of the semester concentrated on mean variance investors and we covered a lot of theory and content in depth. It's extremely important to be able to solve matrices quickly using row reduction techniques learnt in MAST10006 *Linear Algebra* (or MAST10008 *Accelerated Mathematics 1*).

Tutorials

Tutorial attendance is, of course, highly recommended. It is a great chance to ask Jane questions and clarify subject material. There are not many worked solutions in the lectures so the tutorials are a great way to do more problem solving. Jane assigned select questions from each chapter to do before the tutorial and they took an hour or so to do each week, so not very long at all. During the tutorials, we usually did not go over the solutions to the set problems from the book unless there were particularly difficult ones. Instead, we worked through the additional exam style questions she provided at the beginning of the week.

Assessments

I really enjoyed the spreadsheet assignment. I have no experience at all with spreadsheets and it was a great introduction to excel. We were required to create an active workbook that found the weights of five assets to form an efficient portfolio. The question was based on a multi-factor model with two indices and Jane varied the parameters and the lending & borrowing rates to check our outputs. Using the same model, we also had to find the weights for a given mean and another for a given standard deviation. Jane marked the assignments in a way that if we scored less than 8, she allowed us to resubmit the assignment to get a new mark out of 8 if we wished.

The mid semester exam covered topics 1 to 6. We had 3 questions for our exam and the longest one worth the most marks was using Gaussian elimination to find the minimum variance portfolio, and the composition of two efficient portfolios; one for a given mean and another for a given standard deviation. The questions were reasonable and not unexpected. We were given enough time to complete the paper provided we worked consistently. All questions were problem solving rather than theory based although Jane hinted throughout our lectures that we should know our definitions well. Doing the questions at the end of each chapter as well as learning all the formulae in the lectures was enough to do well in the exam.

The end of semester exam was challenging. Jane had provided a number of past exams and sample exams that were a reasonable indication of the length but not of the difficulty. The exam consisted of a mix of theory questions, such as defining Brownian motion, as well as practical questions and proof questions. In the exam, there were a few practical questions in a style that we had not encountered at all during the semester. It was important to understand the differences between APT and CAPM and when to apply each. To do well in the exam, it was crucial to understand all the theories and concepts rather than just rote learning how to solve the questions in the book and the sample exams. To study for the exam, a few of us also memorised some of the proofs of the various theorems covered during the semester. Time management was another issue in the exam and I found that the time spent on solving matrices to find an efficient portfolio did not correspond to the number of points the question was worth. You may consider starting with the shorter questions first before going onto the easy but longer questions

Textbook

Although I bought the textbook, I feel it was not necessary. The lecture slides that you can print from LMS were practically identical to the textbook. The only material you need from the textbook are the questions at the end of each chapter and there were a number of copies in the library you can borrow before a tutorial to see the questions.

Closing Remarks

In summary, MoF2 was a challenging but rewarding subject. The content is manageable and interesting. The most important thing is to understand the content thoroughly and not rely too heavily on the questions in the book or the sample exam questions when studying for the final exam.

ACTL90003 Mathematics of Finance III

Exemption status	Students who perform at a suitably high level in both assignments and the end of semester exams in both this subject and ***ACTL30006 Intermediate Financial Mathematics*** will be recommended for exemption from the professional subject CM2 Financial Engineering and Loss Reserving.
Lecturer(s)	Dr Zhou Jin
Weekly contact hours	3 × 1-hour lectures
Assessments	Individual assignment, due in Week 12 20% Mid-semester exam (Week 6) 10% 3-hour open book end-of-semester exam 70%
Textbook recommendation	Joshi, M. S. (2008). *The Concepts and Practice of Mathematical Finance* (2nd ed.). Cambridge, UK: Cambridge University Press. X Not necessary
Lecture capture	Full (both audio and video)
Year and semester reviewed	2021 Semester 1

Subject content

This subject focuses on the pricing of derivative securities and is very theoretical.

- **Topics 1–2**: Using the Binomial Model to Price Options
- **Topics 3–5**: Martingales, Brownian Motion and Stochastic Calculus
- **Topics 6–8**: The Deviation of Black-Scholes Model and the Greeks
- **Topics 9–12**: Interest Rate and Credit Models used to Price Derivatives

While the first few weeks of content may not seem to be too difficult, it gets progressively harder as stochastic calculus and the derivation of the Black-Scholes model is introduced. Retaining prior knowledge from ACTL30005 Models for Insurance and Finance or ACTL20003 Stochastics Techniques in Insurance will certainly be helpful since many of the content is covered in MoF3 in a lot less detail.

Lectures & Tutorials

In terms of time commitment, I had a three-hour lecture per week rather than a two-hour lecture that I had been used to during the bachelor's course. Twelve more lectures mean more time and energy needed to absorb knowledge, take notes and revise for the final exam. I should not forget to mention that we still have specimen questions included in the lecture notes for us to practice weekly. As there is no tutorial, you might get less motivated to keep up with practice. I would recommend you to attempt them weekly as some questions can be difficult at first sight and you will regret it if all of them are left to SWOTVAC.

Assignments

This subject has one assignment due at the end of the semester and it was released two weeks prior to the due date in my year. I felt that the assignment was easy and we were required to build an Excel spreadsheet for option pricing using a hundred steps binomial tree and the Black-Scholes formula. Your life will be easier if you have completed the lecture materials up until week 8. That being said, you still need to be careful about it as it is quite heavily weighted (20%).

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End-of-semester exam

The final exam consisted of 10 multiple choice questions and eight long answer questions. Admittedly, those long answer questions were much more complicated than the weekly specimen questions. It required a holistic understanding of the concepts of a class of methods or models. One tip I can give is that you might find the revision tutorial (the last lecture in the semester) to be very useful, as those are the key concepts and are highly likely to be examined in the final exam.

Concluding Remarks

I found Mathematics of Finance III to be very challenging. When you break down the subject content, it may seem like there were not a lot of topics, the abstract nature of many concepts meant that you need to invest a lot more time in going through the content and completing practice questions. I also recommend that you try to find additional practice questions using the textbook and online resources, as there may not be enough relevant practice content for the final exam given in the subject alone.

ACTL90004 Insurance Risk Models

Exemption status	None
Lecturer(s)	A/Prof Xueyuan (Shane) Wu
Weekly contact hours	3 × 1-hour lectures
Assessments	1-hour mid-semester exam in Week 7 20%
	Individual assignment, due in Week 12 10%
	3-hour open-book end-of-semester exam 70%
Textbook recommendation	Dickson, D. C. M. (2005). *Insurance Risk and Ruin*. Cambridge, UK: Cambridge University Press.
	Online version is available through the University of Melbourne's library website. A few questions in problem sheets will be from this text, and additional questions are useful in exam preparation. ✓ Recommended.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2020 Semester 1

Comments

This subject begins by introducing various probability distributions and their properties. It then provides various actuarial models for the purpose of estimating premiums and claim costs for insurers and reinsurers of non-life insurance products.

Throughout this subject, an adequate understanding of concepts such as the various distributions, conditioning and moments, MGFs and PGFs taught in MAST20004 Probability, as well as MLE, Bayesian Estimation from MAST20005 Statistics will be very useful.

Although not conceptually difficult, this subject is quite heavy in proofs and formula derivations. Rather than remembering every step of a proof, it is much more important to understand the techniques involved, as proofs are usually tested with slight variations. The calculations involved in this subject are not hard, however, it can be easy to make careless mistakes since it can be quite long and tedious.

To do well in the exam, it is important to be able to fully understand the question and apply the steps and techniques taught in lectures. Some questions may require a lot of personal judgement by asking you to select the most suitable method to apply rather than referring to a particular theory or formula; explanation of the rationale behind model set-ups may also be required in exam questions. Moreover, it is important to be familiar with the formula sheet and know some of the tricks that can be used to solve some otherwise very lengthy expectation calculations (mainly for Pareto and Gamma distributions).

Subject content

The subject is well structured and split into 5 sections.

1. **Distributions in Non-life Insurance:**
   - This section begins with a revision of some basic results of some important distributions within the subject. Later on, we will see how we can find expected payoffs for the insurer and reinsurer under excess of loss and proportional reinsurance agreements. A very crucial lemma for the multiplication of summations is introduced. This result will be used repeatedly in the subject for almost every recursion proof. Finally, the concepts of parameter estimation techniques and the goodness of fit test will be reviewed.

2. **Collective Risk Model:**
   - This is the crux of the subject and the most crucial section. The collective risk model is introduced as a way to

model aggregate claim amounts. Calculation techniques for expected values under reinsurance will be taught and remembering the results for the Compound Poisson will be useful. Not only that, different classes of distributions, and corresponding recursion formulae to find the distribution for each, will play a crucial part in this as well. I cannot emphasise enough how important it is to understand the techniques being used in the proofs, in particular, for Panjer's Recursion. Finally, the chapter ends with some approximation techniques by matching the moments of the collective risk model to the normal and gamma distributions.

3. **Individual Risk Model:**
   - The IRM is similar to the CRM in the previous chapter but with some different assumptions. This chapter has numerous proofs and results. Although De Pril's Recursion was incredibly lengthy, the techniques used within it are definitely examinable. Finally, some estimation techniques using Compound Poisson caps out this section.

4. **Introduction to Ruin Theory:**
   - In our context, Ruin theory says that if an insurer's capital follows a certain process, how long it would take them to go bankrupt. In this subject, only a brief introduction is made for this concept and more details will be involved in RT2. The main concept taught is to find upper bounds for this ruin probability.

5. **Credibility Theory:**
   - Credibility theory is about being able to estimate a future using data for a group, as well as individual claim experience. Using Bayesian techniques, we are able to do this under some distribution assumptions. However, it will soon be apparent that they do not always work, so we introduce a non-parametric technique known as the Empirical Bayes Credibility Theory (EBCT) Models 1 and 2. The proofs within this section can seem quite lengthy and there is a lot of notation to go with it. At first, the results may seem all over the place, but once you get a grasp of the bigger picture and the meaning of each formula, they can possibly be more intuitive than you first thought. Since the exam was open-book, we were asked to use Excel to build the EBCT models and compute the results.

While many techniques will have been familiar from prior studies, there are some new and simple results that are important to know, such as the CDF of a gamma distribution, variations of the Pareto distribution, relationships between different distributions, and so on. Many proofs in this subject are examinable, hence having a good understanding on the techniques used is essential. Utilising first principles to find probabilities and other results is also quite useful when initially attempting a question.

Lectures

This subject involves 3 lectures per week. In addition, there were 6 'tutorials' throughout the semester which take place of a lecture, where Shane will go through questions on the tutorial sheet.

Overall, I really enjoyed Shane's teaching style. He was excellent in explaining every concept in a clear and logical way to ensure that everything makes sense to us. Shane also supplied us with handwritten notes for some of the long proofs and I found these to be very useful. These notes would then be uploaded onto a OneNote file, accessible to the class, which he shared at the start of the semester. I found the tutorial problems to be more difficult than the problem sheets and textbook questions, so they are probably the best practice materials for the exams.

Assignment

The assignment was provided in Week 10 and due in Week 12. It contained only 2 questions, but they were expanded and explored in depth. A significant part of the assignment was on Ruin Theory and being able to calculate the adjustment coefficient in different reinsurance contracts. Most of the calculations were done in Excel, as required by Shane, forming a part of the required submission. The other part of the submission can be handwritten or typed into a Word document.

Mid-semester test

The MST was held online in Week 7. Unlike the undergraduate subjects, the MST counts towards exemption. We were given one and a half hour to complete and upload the test. The MST had 2 multiple choice questions and 3 short-answer

questions. The questions were quite standard and focused on utilising techniques previously used in the tutorial and problem sheets.

End-of-semester exam

The exam was held online in 2020. Different to prior years, we were given three and a half hours to complete and upload our answers. Since this year's exam was open-book, proofs and questions where you could find from lecture slides or textbook were not directly tested, there was a stronger emphasis on understanding the underlying techniques. One practice paper was given; some questions were quite difficult and introduced new ways of applying textbook concepts, which was helpful for the actual exam. Overall, the exam was well written, especially since it was the first time this subject offered an open book exam. It had a good range/length of questions and, with sufficient revision, should all be doable. One point to note was that many questions required numerical solutions that may not seem 'pretty', i.e. having complicated equations, hence it is important to be both fast and accurate.

Concluding Remarks

I found this subject very interesting and well taught. It built on the probability and statistics concepts from earlier years in an insurance context. Shane taught the subject with clarity and dedication; he made sure to go through all the content even though the semester was cut short by a week. There were many practice questions with detailed solutions which greatly aided learning, and Shane provided even more clarification when needed. Overall, this was a subject I thoroughly enjoyed.

ACTL90005 Life Contingencies

Exemption status	CM1 *Actuarial Mathematics I*, in conjunction with ACTL90001 *Mathematics of Finance I*. Satisfactory performance across both subjects is required.
Lecturer(s)	A/Professor Shuanming Li
Weekly contact hours	2 × 1-hour lectures Additional lecture slots were blocked out in case content was not covered 1 × 1-hour tutorial during the two one-hour lectures, however, Shuanming did not use these with us.
Assessments	1-hour mid-semester test in Week 8 20%
	Individual assignment due in Week 12 10%
	2-hour end-of-semester exam 70%
Textbook recommendation	None.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2018 Semester 2

Comments

I really enjoyed ACTL90005 Life Contingencies. The subject really builds on ideas first introduced in ACTL90001 *Mathematics of Finance I* but rather than finding the present value of payments, we found the expected present values instead.

The subject was very content-heavy. The 2019 undergraduate version of this subject (ACTL30003 *Contingencies*) is 25 points, so they had double the lectures and double the tutorials for the same content.

Subject content

- Unit 1: Select life table and ultimate life table
  This unit is very short and gives a definition of a select life.
- Unit 2: Valuations of Insurance Benefits
  This unit introduces different insurance products that will be dealt with in future units, including whole life insurance, term insurance and endowment insurance amongst others.
- Unit 3: Valuations of Life Annuities
  This unit introduces different annuity products such as whole life annuity due, term annuity due, and continuously payable annuities. It also presents different approximations between continuous and discrete annuities.
- Unit 4: Future Loss and premium calculations
  This unit covers the equivalence principle and how to calculate the premiums of different insurance and annuity products.
- Unit 5: Policy Values
  This unit extends on Unit 4 and teaches calculations of the future value of a product under both discrete and continuous models.
- Unit 6: Multiple state Markov mortality models
  This unit builds on the previous two units and looks at premium calculations and policy values when there are multiple states rather than the simple Alive-Dead model.
- Unit 7: Joint Life Theory
  This unit looks at how insurance and annuity benefits are affected when there are two lives involved rather than one.

This review was previously published in the 2018 end-of-year edition of the *Actuarial Students' Society Subject Review*.

- Unit 8: Multiple Decrements and Applications
  This unit teaches us how to build multiple decrement tables, so for example, a table that shows how many lives will die, retire or be injured each year. It also covers calculating future salary and benefits related to salary.
- Unit 9: Emerging costs
  This unit is very spreadsheet-heavy and looks at measuring the profit of different policies from an insurer's point of view.

Lectures

Our lectures moved very fast, so it was essential to attend them. Shuanming also provided additional handouts almost every week so it was doubly important to attend the lectures. The lectures elaborated on the content of the slides and really helped me to understand and give context to each unit. I tried to read through ahead of each lecture to stay on top of this massive subject, but I found the content too difficult to understand by myself without the explanations and timelines that Shuanming drew to explain things.

Tutorials

The tutorials were a great help towards my learning in this subject and I feel that attendance was essential to doing well. The tutorial solutions presented in class were sometimes different from the ones provided online afterwards and it was helpful to see different ways to solve the same problem.

Assignments

Our assignment was individual and mostly done in Excel. The questions were extensions of the examples covered in class. I found the assignment helpful in my revision for the exam as it was due in Week 12 and covered all units.

Mid-semester test

Our mid-semester test was one hour. It was difficult and I believe most people ran out of time. It covered units 1 to 5 and the questions were extensions of the content we had covered. All questions required a deeper understanding of the content and it was not enough to just memorise formulae and rote-learn the units. In particular, I'd hoped the questions covering the first two chapters on insurance and annuities would be straightforward application of formulae to find expected present values, however in reality, we were given questions that required going back to first principles to find slightly adjusted formulae.

Shuanming also wrote a few True/False questions that required us to find different forms of a formula. There was also a surprise question at the end that required knowledge from ACTL90006 *Life Insurance Models I*.

Personally, I found that the lecture examples, tutorial questions and problem sets provided more than enough material to use for revision for this test.

End-of-semester exam

Our exam was 2 hours and covered the whole semester. I found it was important to go to lectures and tutorials. In our last tutorial, Shuanming gave us a breakdown of the exam and expectations we could have for the structure of the final exam. During the lectures, he would also comment on formulae we were required to memorise and ones we did not, as there was no formula sheet provided.

Overall, I found the exam fair. There were many questions that were similar to ones we'd seen in either tutorials or as examples in lectures as well as some more difficult questions that required a deeper understanding of the content. The exam was long and had nine questions, but I found I had some extra time at the end to check over work and properly attempt questions I had skipped. We were provided with one specimen exam that I found more difficult and in a different style to the one we sat.

ACTL90006 Life Insurance Models I

Exemption status	CS2 *Risk Modelling and Survival Analysis*, in conjunction with ACTL90007 *Life Insurance Models II* and ACTL90020 *General Insurance Modelling*. Satisfactory performance across all three subjects is required.
Lecturer(s)	Prof David Dickson
Weekly contact hours	1 × Set of online lectures (adding up to roughly 1 hour) 1 × 1-hour workshop 1 × 1-hour tutorial
Assessments	Group Assignment 1, due in Week 5 10% Mid-semester test, in Week 8 20% Group Assignment 2, due in Week 11 10% End-of-semester exam 60%
Textbook recommendation	Dickson, D. C. M., Hardy, M. R., & Waters, H. R. (2013). *Actuarial Mathematics for Life Contingent Risks (2nd ed.)*. Cambridge, UK: Cambridge University Press. X It is not necessary to buy this textbook. There are several copies in the high use section of the Giblin Eunson library. I would recommend consulting this textbook for additional problems should the problem sheets, tutorial problems and workshop questions not be enough.
Lecture capture	Full (both audio and video) for online lectures. None for workshops.
Year and semester reviewed	2019 Semester 1

Comments

Overall this subject was well taught and the content can be very interesting and intuitive. Assessments were challenging but fair with a wealth of questions to consolidate your understanding.

Subject content

- Modelling mortality — This section introduces lifetimes and how to model these lifetimes. New concepts such as lifetime distribution, survival function and force of mortality, which underpin the remainder of this subject, are introduced. It is important to know the intuitive interpretation and the derivation of the equations.
- Non-parametric methods — This section looked at applying data to model the lifetime distribution introduced in section 1. We start with an introduction to different types of censoring (when data is incomplete) and how to work with censored data then look at two different techniques to model a lifetime distribution.
- Estimating Mortality Rates — This section looks at modelling the mortality rate rather than the lifetime distribution. We examine three techniques; the Two-State Markov model, the Binomial model and the Poisson model. A good way to consolidate your understanding is to derive the Method of Moments Estimate and the Maximum Likelihood Estimate under different assumptions (Constant Force of Mortality, Baldduci, Uniform Distribution).
- Multiple state models — This section requires you to be comfortable with the previous sections as it is in a sense a generalisation of the dead or alive model taught in section 1. The differential equations may at first seem difficult but once you repeat the derivation across multiple questions you will see that the techniques are very routine. It is important to focus on the general techniques for solving and deriving these equations.
- The Poisson Process — This section is very proof heavy and focuses on different theorems associated with the

This review was previously published in the 2019 mid-year edition of the *Actuarial Students' Society Subject Review*.

Poisson Process. By the end of this section, you should be very familiar with the probability functions of the Exponential, Gamma and Poisson distributions as well as their Moment Generating functions. The numerical part of this section requires concepts learnt in Probability such as conditional probability, independence and equivalent events.

- Simulation — This is the shortest section in the course and was covered in the last week of lectures. This topic covers simulating random variables from a discrete or continuous distribution using random drawings from a uniform distribution.

Lectures

The lectures for this subject were delivered purely online. They are clearer than live lectures as David has the luxury of multiple takes. The lectures lasted about an hour in total per week, but I found myself spending two to three hours with pauses to attempt to reconstruct the proofs.

Assignment

The assignment was an individual assignment in Excel. The numerical computations were straight forward but a significant proportion of marks were given for presentation of the excel workbook and the written submission. It takes more time to obtain full marks for presentation than to obtain full marks for the correct answer. Attempting to copy the format and language used in David's textbooks is a good idea.

Workshops

Instead of lectures, David runs weekly workshops. It was an online multiple-choice quiz containing three to four questions. You can log into the website on your phone or laptop and submit the answers anonymously.

Tutorials

We all got a tutorial sheet, worked on a question in smaller groups, and then took turns presenting our solutions to the class. It was a great way to learn new techniques to solve problems as on more than one occasion, the solutions presented in class were different to the solutions uploaded to the LMS. In both workshops and tutorials David would give us key points in the question to look out for to highlight the important parts explained in lectures.

Midsemester test

The mid-semester exam was composed of standard questions across sections 1 and 2 with one challenge question. Doing textbook questions can give you an advantage as some of the question pool stems from the textbook but all questions were doable with the provided material.

Exam

The final exam was slightly more difficult than the mid-term exam purely due to the fact that sections 3 to 6 were more difficult than sections 1 to 2. The paper covered the whole semester's content and not just the second half. This exam was slightly more lenient with computation speed and accuracy as the other actuarial exams. David meant it when he said to not gamble by being an expert in certain areas/types of questions and neglect others. The exam extracted material quite evenly between lectures, workshops, tutorials and problem sets.

ACTL90007 Life Insurance Models II

Exemption status	CS2 *Risk Modelling and Survival Analysis*, in conjunction with ACTL90006 *Life Insurance Models I* and ACTL90020 *General Insurance Modelling*. Satisfactory performance across all three subjects is required.
Lecturer(s)	Dr Kevin Fergusson
Weekly contact hours	2 × 1-hour lectures
	1 × 1-hour tutorial
Assessments	50-minute mid-semester test in Week 8 20%
	Individual assignment due in Week 12 10%
	2-hour end-of-semester exam 70%
Textbook recommendation	ACTL90007 Life Insurance Models II. Available from the bookstore.
	√ Yes, I recommend getting this textbook although all problems, tutorials and lecture material is also provided online as a PDF.
Lecture capture	Full (audio and visual).
Year and semester reviewed	2018 Semester 2

Comments

I thought ACTL90007 Life Insurance Models II was going to be an extension of ACTL90006 *Life Insurance Models I*, but it was completely different. In my opinion, Life Insurance Models 2 uses more statistics and has more theory and less mathematics. The content covered was more in line with what I imagine actuarial modelling is like.

Subject content

Unit 1: Rate Intervals

This unit introduces rate intervals and age labels. It covers life year, calendar year and policy year rate intervals. In my opinion, this unit was the most difficult as some of the calculations of exposed to risk under each type of rate interval was difficult to conceptualise. Wrapping my head around the start of the interval and how that related to a life was, at times, frustrating.

Unit 2: Hypothesis Testing

This unit introduces six hypothesis tests to test the validity of the data: the Chi-Squared Test, the Individual Standardised Deviations Test, the Cumulative Deviations Test, the Runs Test, the Signs Test and the Serial Correlations Test. Advantages and limitations of each test are also covered.

Unit 3: Graduation

This unit covers 4 different graduation methods including the Whittaker-Henderson method, the graphical method, graduation by mathematical formula, graduation with respect to a standard table and graduation using cubic splines. It also covers the advantages and disadvantages of each method.

Unit 4: Stochastic processes

This unit is not related to mortality rate modelling and felt disjoint from the rest of the subject. Markov chains are studied in depth and there is a brief introduction into new stochastic processes such as the Compound Poisson Model and White Noise.

This review was previously published in the 2018 end-year edition of the *Actuarial Students' Society Subject Review*.

Lectures

I found the lecture content sparse. We were able to comfortably fit all content in the 50-minute lectures with time to spare. As a result, Kevin got to know us very well during lectures and vice versa. He knew all of our names which was also a nice personal touch. The lecture content followed the textbook content closely.

Tutorials

In our tutorials, Kevin went through all the solutions on the board and we had the opportunity to input our own opinions on alternative solutions. The tutorial questions were a great opportunity in seeing different applications of the content taught.

Assignment

For our assignment this year, we were required to graduate mortality rates under different models including the Whittaker-Henderson model. Most people used Excel, but we were allowed to use any program we preferred, and some tried their hand at the assignment with R. After graduating our rates, we were then required to perform different hypothesis tests to see if they fit the model well. The assignment was well-designed and gave us a chance for additional practice on hypothesis testing.

Mid-semester test

The mid-semester exam was 50 minutes and covered units 1 and 2. Overall, the exam was doable in the time given. We were required to perform all hypothesis tests from unit 2, including the serial correlations test, which does not have an example in the textbook.

Exam

This 2-hour exam covered all content in units 1 to 4. We had one past exam provided which I found extremely difficult and different from our actual final exam. Our exam had a mixture of theory questions and application questions. I think the professional exams were a good resource for additional questions as we were only provided with tutorial questions and textbook examples. I also found that the theory questions in the exam were similar to the ones from the professional exam. It helped me see which theories were more important and emphasised for this subject. Unit 4 in particular covered loosely-connected ideas and I found the professional exams helped connect and consolidate the required knowledge.

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ACTL90008 Statistical Techniques in Insurance

Exemption status	CS1 *Actuarial Statistics I*, in conjunction with MAST20004 *Probability* and MAST20005 *Statistics*. Satisfactory performance across all three subjects is required.
Lecturer(s)	Dr Enrique Calderín
Weekly contact hours	1 × 2-hour lectures
	1 × 1-hour tutorial
Assessments	50-minute mid-semester exam in week 7 10%
	Individual assignment due on last day of week 12 10%
	2-hour end-of-semester exam 80%
Textbook recommendation	ACTL30004 *Actuarial Statistics* workbook can be purchased from Co-op. ✓ The workbook is essential, as all tutorials are in this book and not provided elsewhere.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2018 Semester 2

Comments

Statistical Techniques in Insurance is a content heavy subject. Although the first chapters fit together nicely, I found some disjointedness in the content overall. The subject covered a lot of ground and I really enjoyed the topics.

Subject content

Unit 1: Introduction to R

This unit covers all the basics in R – from downloading the software to addition in R, to simulating values from probability distributions. Properly understanding this unit is essential to this subject because the assignment requires R coding.

Unit 2: Likelihood Theory

Much of this unit was taught in MAST20005 *Statistics*. It covers maximum likelihood estimation, the likelihood ratio test and the Fisher-Scoring algorithm.

Unit 3: Generalised Linear Models

This unit is an extension of Unit 2 and is especially applicable to actuaries. It covers parameter estimation for generalised linear models and techniques used to assess the statistical significance of the estimated parameter values.

Unit 4: Simulation

This unit covers different techniques in simulating random numbers from a variety of distributions. Some methods covered have been taught in previous actuarial subjects, such as the inverse transformation method, and other new methods are taught, such as the acceptance-rejection method.

Unit 5: Outstanding Claims Provision

This unit covers four different methods used by general insurers to calculate the liabilities.

Unit 6: Experience Rating Systems

This review was previously published in the 2018 end-of-year edition of the *Actuarial Students' Society Subject Review.*

This unit is the shortest section in the whole subject. It introduces the no claims discount system and explains applicable areas of insurance for the model.

Unit 7: Time Series Analysis

This unit introduces times series, which are variables that change over time. I found this unit the most difficult and the most maths heavy. We are introduced to new processes such as moving average processes and ARMA processes.

Lectures

Our lectures this year were during a two-hour time slot on a Monday evening. Fortunately, we were usually given a short 10-minute break in the middle. I attended all the lectures and I feel it was essential and helpful to do so, however, many of my class did not attend or only attended the first half. Although lecture capture records everything on screen, I felt that by attending classes, I was able to pick up hints for exams and assessable material more easily.

Tutorials

Tutorials were essential to attend as the solutions were handed out during class and were not provided online. Furthermore, Enrique often wrote additional notes or fleshed out solutions during tutorials.

Assignment

The assignment was an individual assignment which was done in R. Some of the stuff, such as glm calculations, was covered during lectures but the majority was not and required extra research. A coding background was extremely advantageous in this assignment as we were required to do "if" statements and "for" loops for some questions.

We were given the assignment after our midsemester break and although there was enough time, I found if I had not started on the assignment straight away, I probably would not have been able to finish it. The same assignment was given to the third-year undergraduate cohort but they worked on it in groups.

Overall, I found the assignment enjoyable, albeit at times frustrating, and found it helpful in my learning.

Midsemester test

We were provided with one past mid-semester paper as a guide. The test covered Chapters 1, 2, and half of chapter 3 and included practical questions as well as theory/proof questions. During lectures, Enrique told us which proofs were examinable and highlighted a select few, one of which was in our mid-semester test. There were also a few marks allocated to R code which he also informed us about during lectures. The exam was a reasonable length but as is usual with actuarial papers; I personally did not have time to check over answers at the end.

Exam

Enrique provided the 2017 exam as a specimen paper. I thought it was a good indication of the difficulty of the exam we sat. As usual with all actuarial exams, we were pressed for time. It covered all topics and had a good variety of questions. I believe the material we were given, tutorials and the 2 practise exams, was sufficient revision. During lectures, Enrique also covered tips on what we should memorise for the exam which turned out to be helpful, so definitely attend lectures and make a note when he says something needs to be memorised.

A couple topics I wish I had looked over again before the exam were the lognormal distribution and other common distributions. Although Enrique was fair and provided the probability density functions for more obscure distributions, seeing the lognormal distribution in a No Claims Discount system initially threw me in the exam. Another tip that came up during discussions after the exam was to make sure your calculator is in radians and not degrees.

During our 2018 exam, we were not required to reproduce any proofs of theorems taught throughout the course. Some things examined were not explicitly covered during semester and were assumed knowledge such as finding the quantile function from a cumulative distribution function.

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Concluding Remarks

Overall, the exam was fair and felt like a reasonable test of our understanding of the course. The questions were a challenging extension of what we were taught.

ACTL90010 Actuarial Practice and Control I

Exemption status	ACC *Actuarial Control Cycle*, in conjunction with ACTL90011 *Actuarial Practice and Control II*. Satisfactory performance across both subjects' end-of-semester exam is required.
Lecturer(s)	Mr David Heath: FIAA
	Mr Andrew Brown: FIAA
	Mr Donald Campbell: FIAA
	Mr Julian Gribble: FIAA
Weekly contact hours	2 × 2-hour lectures
Assessments	Group assignment 30%
	3-hour open-book end-of-semester exam 70%
Textbook recommendation	Bellis, C., Lyon, R., Klugman, S., & Shepherd, J. (Eds.). (2010). *Understanding Actuarial Management: the actuarial control cycle (2nd ed.)*. Sydney, AU: The Institute of Actuaries of Australia
	The textbook is X not essential. However, there are also background documents provided on the LMS at the start of the semester. These provide students with some basic knowledge of the three industries mentioned above.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2021 Semester 1

Comments

As David would frequently say, "This subject is unlike previous actuarial subjects that you would have completed." Actuarial Practice and Control I (APC1) takes a step back from all the formulas and theory taught throughout the actuarial major and instead teaches the core skills and considerations that actuaries make in their day-to-day lives. As a result, the subject generally takes a bigger picture view on stakeholders and analyses the need for the actuarial profession in the first place – to be able to consider the different needs of the consumers, providers and the environment whilst solving commercial problems.

The subject itself is somewhat similar to Organisational Behaviour. Many of the concepts taught are qualitative in nature, where there is no black or white answer. To do well in APC1, it is important to recognise that many of the different learning objectives are intertwined, and to account for this when answering questions. Case studies such as the *2019 Hayne Royal Commission*, *ASIC's report into Consumer Credit Insurance* and *APRA's 2018 prudential inquiry into CBA* are considered to provide examples of where some or more of the learning objectives are not properly considered in practice.

I found this subject a refreshing deviation from the normal derivations and numerical problem-solving by virtue of traditional actuarial subjects. Whilst three-hour lectures can be sometimes hard to sit through when pre-recorded, the content taught is interesting and trains a mindset of a professional actuary. APC1 also introduces many of the different products used in life and non-life insurance, and superannuation – this knowledge is helpful in understanding the industries when you inevitably have interviews and assessment centres.

Subject content

This subject, alongside its twin Actuarial Practice and Control II, includes 14 learning objectives that cover the Actuarial Control Cycle component of the Actuary Program syllabus. APC1 covers the first seven learning objectives, which tend to focus more on the professional aspects and knowledge required for the actuarial profession. This includes topics such as the products that actuaries work with; professionalism; regulation; risk assessment and management; and policy.

1. Discuss and apply an **Actuarial Control Cycle** in a variety of practical commercial situations
2. Relate the main features within the general **environment** to medium and long-term commercial decisions
3. Analyse the main **features and risks** of financial product and contracts, from the **point of view** of consumers and providers
4. Demonstrate an understanding of **Enterprise Risk Management**
5. Apply a **risk assessment framework** in a range of situations
6. Discuss and apply the process of **product design**
7. Understand how **models** are used to solve client problems

Lectures

This year's lectures were again taught online, with all of the lectures pre-recorded and uploaded onto Canvas. The traditional two-hour lectures were often split up into two or three separate recordings to help make them more manageable to go through. Each of the lectures would also be taught in 'blocks' of material, followed by exercises. This allowed for more natural breaks within each lecture and also made good practice for the exams.

As all the learning objectives can be applied in any industry, often two or three lectures would cover the same topic but from the point of view of a different industry. For example, David would provide a lecture on the features and risks of general insurance products and Donald would then have a lecture on the features and risks of products in superannuation. Whilst the material was generally taught in the order of the learning objectives, sometimes the order of upload can be confusing as one lecturer moves onto the next learning objective before the others – make sure you keep your notes separate for each learning objective!

Personally, I could not watch a whole lecture without getting distracted – a couple of hours of staring at a screen certainly does not do well for your eyes either! I eventually found that listening to the lectures as a podcast whilst travelling helped me stay a lot more engaged. Afterwards, I would go through the slides and properly take notes, which reinforced my learning as I was going through the material multiple times – something to try if just watching lectures does not work for you!

Assignments

The group assignment mimicked a consulting project where students were required to advise a company about the impacts of mortality improvement and other risks that may be associated with it. In line with a *'control cycle'* approach, the deliverables included a draft report and client newsletter (10% of total marks) for which feedback was given. The feedback was then to be incorporated in a revised report and newsletter (20% of total marks).

Ultimately, the group assignment is a **group** assignment. You are given around four weeks for the draft submission and around one and a half weeks for the final submission. As a result, starting early, setting achievable goals and having regular catch ups are key to having a good mark. This year, the assignment was due right after the mid-semester exams of the three other ACTL subjects, so setting deadlines for each stage of the report was essential to be able to finish before everyone goes to cram for their other subjects.

End-of-semester exam

The exam was delivered online through Canvas, where we were required to upload our typed solutions to answer each of the questions. As the exam was open-book in the past, the format and type of the exam did not change much from the practice papers. As mentioned in the overall comments, many of the learning objectives are connected. It is important to not only discuss an answer related to one objective, but also the relationships among each of the objectives. For example: How would the current environment affect how you design a product? (LO 2 & 6)

Three hours is very achievable for the exam if you know your content well. However, if you need to check your notes for each question, then you could be pressed for time. As a result, make sure that your notes are organised in a way for you to easily navigate and try to provide your answers in dot-points – this makes it easier for the marker to highlight which points to mark and also means you write less.

ACTL90011 Actuarial Practice and Control II

Exemption status	ACC *Actuarial Control Cycle*, in conjunction with ACTL90011 *Actuarial Practice and Control II*. Satisfactory performance across both subjects' end-of-semester exam is required.
Lecturer(s)	Mr David Heath: General Insurance — Subject coordinator; Mr Andrew Brown: Life Insurance Mr Donald Campbell: Superannuation Mr Andrew Gale: Health Insurance
Weekly contact hours	2 × 2-hour lectures
Assessments	Group assignment, due in Week 5 15% Group assignment, due in Week 10 15% 3-hour end-of-semester exam 70%
Textbook recommendation	Bellis, C., Lyon, R., Klugman, S., & Shepherd, J. (Eds.). (2010). *Understanding Actuarial Management: the actuarial control cycle* (2nd ed.). Sydney, AU: The Institute of Actuaries of Australia. The textbook is X not essential.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2020 Semester 2

Overall Comments

Actuarial Practice and Control II is the continuation of the previous course, APC I. Both APC subjects form a bridge between the technical skills previously taught in *Part I* subjects and their applications in a business and commercial context. Therefore, they require, to a large extent, personal judgement and experience. Consequently, you should be thinking comprehensively and considering all potential implications when provided with specific cases.

APC II is slightly more technical and challenging compared to APC I, as it covers the techniques relevant in pricing products and calculating financial statement item and requires more industry knowledge together with a deeper understanding of the inter-relationships between the topics. In terms of succeeding in this subject, I found that studying in groups allowed me to best strengthen my understanding for each topic.

Subject Content

1. **Model**:
   - Selecting an appropriate model to solve actuarial problems. The majority of this topic has been studied in APC I, hence it is not explored in detail here.
2. **Capital**:
   - Recognizing the importance of capital, which is defined as the "excess of assets over liabilities", and the difference between regulatory and economic capital. We mainly discuss the purpose of capital, how capital is acquired, the quality of capital, and the calculations of regulatory capital requirements.
3. **Liabilities**:
   - This includes liability valuation, different types of liabilities of an insurer, and relevant economic and financial assumptions used in the valuation process.
4. **Pricing**:
   - This topic covers pricing of products and contracts. In particular, how premiums are calculated and what risks should be considered in the process of pricing.
5. **Solvency**:

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- Measuring, reporting, and managing solvency of an insurance company, which is defined as the issue arising if insurers cannot meet the obligations as they fall due. We explored different types of solvencies in each actuarial industry and the corresponding solvency measures.

6. **Profit**:
   - Measuring and reporting profits as they emerge. The Accounting Principle indicates that revenue is only re-cognised when services are conducted. In terms of insurance companies, the emergence of profit is largely affected by liability valuation. We studied how profit emerges in each actuarial industry and ways to distribute or retain profit.

7. **Monitoring & Managing the business**:
   - These two topics complete the control cycle, highlighting its nature as a feedback loop. It is crucial for actu-aries to monitor assumptions, evaluate performance, and make appropriate adjustments according to either favourable or unfavourable outcomes.

Lectures

The lecturers cover the previously mentioned topics by industry. For example, we would often have a lecture on Superan-nuation Solvency, followed by Life Insurance Solvency and General Insurance Solvency. The lectures are very similar to those in APC I, except that there is an additional lecturer for Health Insurance — Andrew Gale. There are only two lectures on Health Insurance and they are pretty much introductory compared to most of the lectures in the other industries.

Some of the lectures contain case studies, which can be used to test yourself on the ability to apply knowledge to real-life problems. However, solutions were not provided for all of the examples, and students were encouraged to post their answers in the discussion forum to share answers with other students and have meaningful discussions. I personally found it useful to compare my approaches and ways of thinking with other students to enrich my understanding of the subject content and identify any areas where I might need to improve on.

Assignments

For the group assignment, we acted as consultants to a superannuation fund to provide actuarial advice and develop a detailed methodology for the valuation of the fund's long service leave liability. Final submissions required a draft report and a final report.

The assignment was designed to imitate the stages of an actual work project. The reports were written in an executive summary format and advice provided was required to touch on the relevant accounting and actuarial regulations. Since the methodology for valuing long service leave liability was not covered in lectures, my group spent days researching the correct valuation method used by insurers in Victoria. What also proved to be difficult in completing the assignment was explaining actuarial concepts and formulae in plain language to the intended client - an accountant with no actuarial background. Luckily, David provided us with detailed feedback after reading through our draft report and we were able to produce a much better final report.

Overall, the assignment was harder compared to the assignment in APC I, since the knowledge required to complete this assignment was not covered in detail in lectures. However, with a reasonable amount of research, this assignment could be managed and completed within time frames. It should also be noted that, in this semester, the assignment was not considered for *Part II* exemptions, but it will affect your subject score at the end of the semester.

End-of-semester Exam

The final exam is open-book, so we were allowed to bring annotated lecture slides, the textbook, and other notes. When preparing for the exam, it is important to consider the interconnection between the topics, since, in reality, they do not exist in isolation. All questions required short and long answers, which can be done either in paragraphs or dot point form, depending on the question. Some questions can require an email or letter type of answer format. One exam question typically covers content from more than one topic. Marks were allocated based on whether key points have been covered

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in the answer and sometimes bonus marks are given out for answers that showed a reasonable level of "thinking outside the box". Overall understanding of all the issues learned throughout the semester is required to be expressed effectively in the exam.

The exam was quite lengthy, although three hours sounds like a long time, it was definitely packed with writing (or in the case of an online exam, typing) from start to end. The specimen exam provided prior to the exam was both shorter and easier than the actual exam.

ACTL90013 Actuarial Studies Projects

Exemption status	None
Lecturer(s)	Dr Kevin Fergusson Dr Rui Zhou Dr Zhuo Jin
Weekly contact hours	3 × 1-hour workshop per project
Assessments	3,000 word individual report, due at the end of Week 8, Semester 1 25% 3,500 word individual report, due at the end of Week 4, Semester 2 35% 4,000 word individual report, due at the end of Week 12, Semester 2 40%
Textbook recommendation	None
Lecture capture	Full (both audio and video)
Year and semester reviewed	2020 All Year

Overall Comments

Actuarial Studies Projects is one of the two research subjects offered by the faculty, the other being the year-long research thesis. For those that are interested in completing a PhD, it is recommended to do the research essay. However, the majority of the cohort had chosen to undertake this subject, as it appears to be less demanding. This subject consists of three eight-week long projects, and there is no exam at the end of the year.

Subject Content

1. **Project 1** — The first project was led by Dr Kevin Fergusson and focused on analysing investment strategies for the purposes of mitigating interest rate risks. Key concepts used were from second-year financial mathematics subjects, as well as the *Black-Scholes option pricing model* which was taught in *Advanced Financial Mathematics* in the first semester of my postgraduate studies. For this project, Excel was sufficient to complete all the tasks, though it may have been possible to utilise R packages as well. Kevin had provided a detailed template on how to tackle each part of the problem, as such the overall difficulty of the project was not too high.

2. **Project 2** — The second project was led by Dr Rui Zhou and focused on analysing *longevity risk* hedge products. Some parts of the projects were quite similar to Assignment 1 have done in Contingencies back in 2019. For this project, R was required, and it was a bit of a struggle at first since I have not used R in quite a while. Nevertheless, once I remembered how to write functions, the majority of the technical portion of the project was fairly straightforward. More research was required by this project compared to Project 1, as concepts such as *basis risk* were not taught in previous subjects. There were quite a few research papers online, which you could find by either googling or going through the sources of the required reading provided.

3. **Project 3** — The third project was led by Dr Zhuo Jin and focused on analysing a ten-stock portfolio, as well as related options contracts and the *volatility index* (*VIX*). This project requires knowledge taught in Zhuo's third-year and fourth-year financial mathematics subjects, including *single and multi-factor models*, *mean-variance analysis*, and *options* knowledge. Excel was more than capable of completing the technical analysis, as long as you know how to use the Regression tool and Solver. However, no readings were provided for this project, as such it was hard to tell to what extent was required by Zhuo's standards. Overall, it did not feel like a particularly hard project, I was able to complete most of the project by watching several Youtube tutorials or explanatory videos, as well as going through just a few chapters of an ebook I have found from the university library website.

Summary

Being successful in this subject, largely depends on how well you can manage time. The advice is obviously to complete as much as possible, as early as possible, because as the semester goes on, you usually get assignments from other subjects (they all come at once!), or it is getting closer to the exam period and you do not want to be stressed out. The project leaders were quite helpful and would respond to questions through emails, so do not wait for consultations which only occur every three weeks.

Another key factor for success was being innovative. Whilst not as important for the first project, the second and third projects had specific requirements of 'innovation' in the marking criteria, as such it is important to look beyond the readings provided by project leaders, and find ways to incorporate something different into your report.

Looking back, this was one of my favourite subjects in my postgraduate degree as it provided good practical experience and allowed me to apply knowledge learnt to a more 'real-life' situation. It is also something worthwhile to bring up in an interview, especially if you did not get the opportunity to work on large projects during your undergrad degree. For those who are not sure what subjects to take, I would strongly recommend giving this subject some consideration!

ACTL90014 Insurance Risk Models II

Exemption status	None
Lecturer(s)	Dr Enrique Calderín
Weekly contact hours	3 × 1-hour lectures
Assessments	Mid-semester exam in Week 7 20%
	Individual assignment, due in Week 10 10%
	3-hour end-of-semester exam 70%
Textbook recommendation	Dickson, D. C. M. (2005). *Insurance Risk and Ruin*. Cambridge, UK: Cambridge University Press.
	The textbook is X not essential. However, it is extremely good at explaining some of the more complex concepts learnt. The exercises in the textbook are also useful for exam practices.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2020 Semester 2

Overall Comments

Insurance Risk Models II (IRM2) is an extension of ACTL90004 *Insurance Risk Models* (IRM) and has a similar level of difficulty. In comparison to IRM this subject concentrates more on the application of theories in practical insurance problems, instead of the models that insurance companies use. The concepts in this subject are a lot easier to understand than the abstract *martingale theory* of financial mathematics, however, the challenging part of this subject is to derive and solve complicated differential equations, which often requires solid computational skills. Nonetheless, if you have done well in IRM, this subject should not be too difficult.

Overall, IRM2 will not be as conceptually challenging as many of the subjects you will have taken in the past. Resultantly, many of your mistakes in calculations will be silly mistakes, so it is always useful to double-check your working before moving onto the next step. In the assessments, the questions that differentiate good and excellent students are likely to be those that require you to prove something or derive/solve complicated differential equations. To conquer those questions, you will need to find your best way to understand the proof of each theorem and be able to use them flexibly.

Honestly, if you have made it this far into your degree, it should not be too hard to do decently well in this subject. Best of luck!

Subject Content

While this subject's precursor deals with models for a general insurance company, Insurance Risk Models II is concerned with the decisions made by the Insurer in a variety of contexts. The subject content is split into 4 distinct units:

1. **Utility Theory** makes its return from ACTL30006 Intermediate Financial Mathematics. Calculations on the minimum and maximum premium amounts that should be charged for a given risk and utility function are the focus of this unit.
2. **Premium Principles** explores a wide range of methods to calculate premiums by taking into account the moments of the corresponding distribution of risk.
3. **Optimal Reinsurance Arrangements** is where the subject starts to get a bit hairy. *Suppose an insurer is thinking about reinsuring its business; what type of reinsurance arrangement should it take (e.g. Excess of Loss, Proportional)?* Depending on the goals of the insurer, the optimal reinsurance arrangement is different. Here you will cover an onslaught of theorems to rigorously prove the optimality of these arrangements — arguably the hardest part of the course.

4. **Ruin Theory**: Insurers are always at risk of becoming ruined (i.e. having no more money). Assuming that claims paid follow a compound-counting process, we are interested in the probability that this actually occurs over both finite and infinite time intervals. Interestingly, the answer is not always 1 in the infinite time case. This topic derives *Lundberg's inequality for the probability of ruin* (which you may remember from IRM), covers finding the analytic solutions for the *ruin probabilities* (assuming certain distributions) using various calculus techniques and derives approximations to the ruin probability.

Lectures

Much like in IRM, slides were released in units (with the exception of Unit 4 which was released on a rolling basis). Enrique went through each slide, filling in any blank space with proofs and examples as they appeared. However, the pace of teaching was quite fast and sometimes it could be difficult to follow up on the lectures. Other than that, Enrique explained the theorems comprehensively using additional diagrams not found in the lecture notes; I found those diagrams very helpful to understand the theorems.

Occasionally, a tutorial was held in place of a lecture, in which Enrique worked through around 5 questions. In addition to tutorials, problem sheets were provided on LMS on a weekly basis for students to practice. Some of the questions in the problem sheets were closely related to knowledge taught in IRM (especially for *(a, b, 0) and (a, b, 1) classes of distributions*), hence you need to be very familiar with those concepts and formulas. Additionally, some of the questions referred to the textbook.

Mid-semester Exam

The mid-semester exam was held in Week 7, with a specimen mid-semester exam provided as practice beforehand. In 2020, the only units that were examinable were Units 1 and 2.

Due to the pandemic, all exams were taken remotely and therefore the exam structure was quite different from previous years. Questions in the exam ranged from theoretical questions to computational questions, and these were asked in forms of multiple-choice, short-answer and long-answer formats. The mid-semester exam was relatively easy, considering the strong set of mathematical tools that the undergraduate course should have equipped you with.

Assignment

Questions in the assignment were primarily related to Unit 3, with one question on Unit 4. It was a very long assignment, with seven lengthy questions. Overall, none of the questions in the assignment were too difficult to answer. However, there was one question whose tasks were to conduct additional reading outside the scope of the subject to reproduce the proof from a specific paper; another question that required the use of RStudio to produce different diagrams.

End-of-semester Exam

There was a specimen final exam provided as a practice, although only a few of the practice questions were closely related to those in the real final exam. Due to the nature of an online exam, questions focused more on your understanding instead of your computational skills. For example, instead of asking students to derive a specific mathematical expression — like what would be normally asked, students were given the derivation and were asked to explain the derivation in detail.

There were three multiple-choice questions and eight long-answer questions in total, with more of a focus on Units 3 and 4. Many of the questions were quite approachable. Questions ranged from some calculation questions like: *"Should an individual purchase an insurance at a specific premium using utility theory"* and *"Prove that a reinsurance arrangement is optimal"*, to explanatory questions like: *"Explain intuitively what this mathematical expression means"*.

ACTL90018 General Insurance Practice

Exemption status	None; this subject does not constitute any exemption requirement but is intended to prepare students for their *Fellowship Program* exams.
Lecturer(s)	Mr David Heath Ms Lynda Young Mr Cameron Lucas
Weekly contact hours	2 × 1.5-hour lectures
Assessments	Group assignment, draft due in Week 9, final due in Week 12 30% 3-hour end-of-semester exam 70%
Textbook recommendation	Hart, D., Buchanan, B., Howe, B. (2007). Actuarial Practice of General Insurance (7th Ed). Sydney, AU: The Institute of Actuaries of Australia. The textbook is mentioned a few times during the semester, but the slides are more than sufficient for the subject.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2018 Semester 1

Comments

One of the main draws for doing the Masters of Commerce instead of Honours is the opportunity to study General Insurance Practice (GIP) to prepare for your Part III exams if you choose to specialise in general insurance. Taken by working actuaries, this is one of the most practical subjects you will study, and will give you a great taste for what is to come.

Subject Content

The subject aims to be a watered down version of the 3A and 3B General Insurance modules with the Actuaries Institute. Obviously, it would be impossible to fit everything in these modules in this subject, but nonetheless, this subject is still an excellent introduction into the main aspects of general insurance (GI). The topics are categorised as follows:

General Insurance Products (4 lectures) – Before studying what actuaries actually do in GI, we require a strong understanding behind the general insurance products out there, and how they work. Different insurance products will have very different characteristics. For instance, workers' compensation insurance claims might take years to resolve, but something like a comprehensive motor insurance claim may only take a couple of weeks. The impact that these differences have in an actuary's work will become clear as the semester progresses.

Liability Valuation (3 lectures) – Now that we know about GI products, we get to some numbers. Some claims might take years to resolve. Of the claims that have come through the door, how might we estimate the amount of money that we expect to pay out for these claims? Actuaries use development triangles (which was briefly touched upon in ACTL30004 *Actuarial Statistics* under the name Run-Off Triangles) to do just that. Different models such as the PPCI, PPCF, PPAC models and more are touched on here, each of which relies on a different aspect of the claim handling process, and an explanation as to when one may be more appropriate to use than another.

Reserving (4 lectures) – Balance sheets for an insurer are quite interesting. Recall that an asset/liability is an expected cash inflow/outflow from an entity arising from events that have occurred in the past. For an insurer, reserves are created for claims that have been made in the past, but these amounts are unknown: we don't know if an injured person will need $1,000 to pay for medical fees in the future or $100,000! Touching upon the accounting principles of revenue recognition,

This review was previously published in the 2018 mid-year edition of the *Actuarial Students' Society Subject Review*.

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matching expenses to revenue and conservatism, the ideas of unearned premium reserve, outstanding claims reserve, premium liability reserve, and unexpired risk provision are explored. Among other topics, accounting for the uncertainty in these reserves is covered as well, before finishing off with reconciliation, which helps actuaries understand the movements in the outstanding claims provision from period to period.

Pricing (5 lectures) – How exactly do we determine an appropriate premium to charge customers for coverage? A premium should cover what we expect to pay out and any expenses we may incur, as well as a profit margin. However, there may be some instances where premiums charged are much higher or lower. Why would that be? Things to consider while pricing are covered here, as well as modern techniques for pricing premiums, which touches on some machine learning ideas (such as overfitting and cross-validation), machine learning models (such as gradient boosted machines, and random forests) as well as the Generalised Linear Model (which you should be very familiar with from *Actuarial Statistics*).

Capital (2 lectures) – i.e. the excess of assets over liabilities. Recall that insurance is about bearing the risk of policyholders. If the money we have set aside for claims is not enough, then the insurer goes bust. To account for this, APRA (the regulator for insurance) requires insurers to hold a minimum amount of capital. How exactly is this minimum amount determined? Two insurers with the same number of policies may have vastly different capital requirements, simply due to the nature of the types of insurance products they provide.

Following these broad topics, a series of single topic lectures are delivered. The first dedicated to Government Injury and Disability schemes, giving some background behind insurance schemes that have government involvement such as Worksafe and the TAC. Accounting statements and profits are covered as well, showing how our reserving assumptions may affect how profit emerges for an insurer. Lastly, the role of the appointed actuary is covered, outlining what the requirements of the appointed actuary are, as well as the reports they are responsible for. The last few lectures are dedicated to revision.

The subject is still in its infancy (only being the second time the subject was delivered) and there are no strict curriculum requirements set by the Actuaries Institute, so the content is quite malleable. Lecturers are always open to feedback to see how the subject could be improved as well. Because of this, don't be surprised if the way the subject is delivered is vastly different to what is in this review. Overall, like the APC subjects you would have studied beforehand, the subject is quite qualitative.

Lectures

Just like in APC, the subject is delivered by a number of working actuaries. David Heath makes a return from APC as the subject coordinator, alongside Lynda Young (who delivered the reserving module) and Cameron Lucas (for the pricing module). Each of the lecturers were extremely clear in explaining specific ideas and encouraged students to ask questions that they had during the lecture. As such, lectures were very engaging, despite starting at 5:15pm.

The cohort of 2017 left an extremely good impression for the lecturers, as there was active discussion from not only the lecturers, but also the very small cohort. I think David was hoping to reproduce that experience in 2018, where unfortunately, the cohort was very quiet. I strongly encourage you to answer questions that are asked by the lecturers, as they not only force you to think a bit more, but they might also help to correct some of the misunderstandings you may have about certain concepts. You don't have to be correct all the time!

Discussion Forum

Just like in APC, the discussion forum is available for students to ask questions they had about the subject content. Apparently this was used heaps in 2017, but it was not used at all in 2018 (and I imagine David will point this out when he teaches the subject in 2019). Unlike the Online Tutor, the discussion forum is not anonymous.

Students can provide answers for questions others have posted, as well as lecturers. With the right cohort, this would be an extremely powerful tool to help consolidate understanding, as you would be able to (attempt to) answer another student's question with what you think the answer is, and the lecturer would be able to not only answer the original question, but

also comment on the response that you provided (either confirming that you were right or providing amendments to your answer). Try your best to use it if you don't understand something in the subject. There is nothing wrong with being incorrect!

Group Assignment

The group assignment involved looking at the annual reports of two very different insurers, looking at a number of figures from the balance sheet and income statement, and commenting on them. Students were then asked to compare the difference of the figures between the two insurers by considering the characteristics of the two insurers. Like in APC1 and APC2, a report was meant to be submitted in two parts: a draft, and a final after feedback was provided on the draft report.

Overall, students performed fairly poorly. I personally felt like it was a bit unclear as to what David was exactly looking for, and David spent a bit of time in lectures clarifying what exactly he was looking for before the deadline for the final report. Despite that, the assignment was designed to help students understand some of the reasons behind the figures in the annual reports, and in that regard, it was extremely helpful.

End-of-Semester Exam

Much like the APCs, the end-of-semester exam is a three hour exam. However, unlike the APCs, it is a closed-book exam, meaning we could not bring in our 300-page binder of notes. A specimen exam is provided, which is a good indication of the types of questions you will encounter in the exam. However, I thought the actual exam was ever-so-slightly harder than the specimen.

Everything on the course was examined, from liability valuation, to reserving and pricing. I found the exam to be quite a bit more computational than the APC subjects before it, so some comfort can be derived from that. Depending on the question, you may also be able to use the numbers provided in the question as a check for your calculations. If you have studied machine learning in the past, then that will also help you heaps for the pricing section. I found the trickiest part of the exam to be the reconciliation section.

Overall, I felt the exam was very fair.

Concluding Remarks

Thinking back on it, I should have taken advantage of the fact that it was delivered by working actuaries to ask more questions, as ultimately, this is what I am likely to end up doing for a huge chunk of my career. GIP was an incredibly interesting subject, and I strongly recommend taking it.

ACTL90019 Data Analytics in Insurance II

Exemption status	DAP *Data Analytics Principles*, Satisfactory performance in this subjects' end-of-semester exam is required.
Lecturer(s)	Dr Rui Zhou
Weekly contact hours	$2 \times$ 1-hour lectures
	$1 \times$ 1-hour tutorial
Assessments	$2 \times$ Group presentations, due in Week 8 and Week 12 30%
	hour open-book end-of-semester exam 70%
Textbook recommendation	James, G., Witten, D. Hastie, T., & Tibshirani, R. (2013). *An Introduction to Statistical Learning with Applications in R.*
	The textbook is ✓ essential, as it provides in-depth explanations of the intuition behind many concepts taught in the lectures.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2020 Semester 2

Overall Comments

This is a new fourth-year subject and is one of the *Actuary Program* exemption subjects. It builds on the concepts taught in ACTL30008 Actuarial Analytics and Data I, going through almost identical topics, and focuses on many practical examples throughout lectures and tutorials. While technical skills in R is essential, the subject also requires strong analytical skills. Being able to interpret results is key to learning the content well.

The subject was quite enjoyable, as I really enjoy Rui's style of lectures, and the content taught throughout this subject does seem more practical than many others in the past. To future students, I would encourage everyone to not just aim to master the R programming language, but also work on interpreting results, as you definitely need the combination of both to do well in this subject.

Subject Content

The subject covers the following topics:

1. **Regression & Classification**: linear regression is a useful tool for predicting a quantitative response, whereas predicting a qualitative response for an observation can be referred to as classifying that observation since it involves assigning the observation to a category, or class.
2. **Resampling**: resampling methods involve repeatedly drawing samples from a training set and refitting a model of interest on each sample to obtain additional information about the fitted model.
3. **GLM**: generalized linear models can be used to model both frequency and severity from claim data
4. **Tree-Based Methods**: tree-based methods involve stratifying or segmenting the predictor space into a number of regions, methods include bagging, random forest and gradient boosting.
5. **Neural Network**: the central idea of neural network is to extract linear combinations of the inputs as derived features, and then model the target as a nonlinear function of these features

Lectures

Rui releases lecture slides and recordings at the beginning of each week. The lectures are quite often split between theoretical content and practical demonstrations on R. Most of the theoretical content is directly extracted from the textbook, with some level of restructuring. Generally, the theory covers the concepts used in the practical example that follows, where Rui

applies these concepts to a dataset of her liking. Personally, I really enjoyed the lecture structure, as Rui's demonstration on R certainly reinforced the theory that precedes it, giving students a better grasp on how textbook knowledge works in real life. The lecture slides are not necessarily considered comprehensive, as only brief descriptions are provided. Therefore, reading the textbook is recommended in order to get a deeper understanding of the intuition behind the concepts.

Tutorials

The tutorials focused on R applications of the concepts taught in lectures. I personally found the tutorials useful, as the relevant techniques demonstrated by Rui were very helpful when it came to completing assignments or the exam. Detailed solutions are uploaded as well, though it goes without saying that listening to how Rui interprets the outputs is extremely beneficial in improving your own understanding.

Assignment

The only in-semester assessment was the group assignment. Students formed themselves into groups of three, chose any dataset of interest and utilised data analytics techniques taught throughout the semester to analyse the dataset. Groups were judged on two presentations. The first covered mainly introductory content, outlining the objective of the analysis, and conducting exploratory data analysis. The second focused more on the methodologies used for the analysis and how groups responded to any issues they faced. Overall, this assignment was a great way to summarise the majority of the course content, as you need to have a thorough understanding of the advantages and disadvantages of different models and methods.

End-of-semester Exam

The end of semester exam was conducted using R, lasting for four hours. While this may seem like a long time, do not be fooled. The exam was still packed with many questions, and most people ran out of time. The exam was split into two sections (six questions each). The first section was spent answering general theory questions, whilst the second was spent analysing a specific dataset. The marks were not allocated proportionally, however, as the second section of the exam was worth about double the marks of the first half, so do spend time wisely. I would say that most of the content did come from lectures and tutorials, but you definitely need to be very familiar with both coding and interpretation to complete all questions in a sufficient time manner.

Breadth and Elective Subjects

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Breadth Subjects and Master's Electives

BLAW10001 Principles of Business Law [SM1]

Lecturer(s)	Dr Tanya Josev
Weekly contact hours	1 × 2-hour lectures
	1 × 1-hour workshop in Weeks 3, 8 and 12 (optional)
Assessments	2 × multiple-choice quizzes in Weeks 4 and 9 2 10% = 20%
	1.5-hour end-of-semester exam 80%
Textbook recommendation	Lambiris and Griffin. (2017). *First Principles of Business Law.*
Lecture capture	Full (both audio and video)
Year and semester reviewed	2020 Semester 1

Comments

Principles of Business Law should have a considerably less workload compared to your other actuarial subjects, giving you more time to focus on them. Through this subject, I got an understanding of what it is to actually study law and learnt about important real-life scenarios which could potentially affect me when it comes to contract law. I highly recommend this subject if you are keen on getting a taste of what learning law is like.

Subject content

1. **The nature and function of law**:
   - This section introduced different types of law and gave a summary of who makes law.
2. **Legislation as a source of law**:
   - This was the first content-heavy week in terms of material. It talked about the legislative process in significant detail and introduced the legislatures in each state of Australia.
3. **Role of the courts in law-making**:
   - We were presented with the basic procedure of a civil case and made familiar with important law jargon such as *Stare Decisis* and *Ratio Decidendi*. I'd suggest understanding these two concepts thoroughly, as they were tested in both the first quiz and in the final exam. It was also in this chapter where different cases were first introduced.
4. **Contract Formation**:
   - This subject heavily focuses on contract law and devoted 5 weeks of learning to it. Here, we were presented with what a contract is and what it means for a contract to be created and enforced in law.
5. **Terms of a Contract**:
   - Here, we were presented with some terms that later become essential when deciding if a contract has been breached or not. Classifications such as *Conditions* and *Warranties* is paramount to your understanding this section, particularly the hypothetical tests to classify each term. The latter half of this topic touches upon the key sections of the Goods Act and how they protect consumers.
6. **Discharge of Contractual Obligation**:
   - We were introduced to different levels of performance and the different kinds of breaches. Understanding the terms learnt in the previous topic is key to fully comprehending this topic's content.
7. **Remedies for Breach of Contract**:
   - We were presented with different remedies that are available for different degrees of contract breaches.

8. **Circumstances that may invalidate legal transactions**:
    - This was the last week of contract law and discussed in depth the situations in which contracts can be defaulted. This was possible via proving that vitiating factors existed, such as: duress, undue influence, mistake, unconscionable dealing, misinterpretation and illegality. Proving these existences required us to implement hypothetical tests and compare these to the outcomes to past cases that had been decided upon.

9. **Consumer Protection**:
    - This week discussed important sections of the Australian Consumer Law and how it protects consumers. A key section is classifying who a consumer is and how they are defined. This is important because different sections of the Australian Consumer Law state whether it applies to only consumers or anyone.

10. **Tort Law**:
    - A brief summary of the different types of tort law was introduced before learning in detail the *tort of negligence*. We were presented with the necessary elements to establish negligence, and later discussed remedies if negligence had been deemed existent.

Lectures

Tany broke down 2-hour lectures into 4–5 smaller videos that were much easier to digest and also gave me the freedom to take breaks in between the lectures. These videos were again broken down into topics, making the content much easier to comprehend. Moreover, what I really enjoyed about Tanya's lectures was the last video in each of her lecture, where she discusses a hypothetical situation. Here, we used apply theory and concepts learnt in the former sections of the lecture to new hypothetical situations.

Workshops

Before each of the online quizzes and the final semester exam, a sample paper was released. Workshops would involve discussions on the questions from this paper. Similar to the lectures, workshop videos were broken down and seperated the questions by topics. This made it easier for students to keep track of the content and identify sections they struggle with. I'd suggest attempting the sample papers before watching the workshop videos, because the questions are much trickier than you think and the explanation then helps to clarify any doubts.

Multiple-Choice Quizzes

There were two online multiple-choice tests consisting of 40 questions each, and were to be completed in an hour in one sittings. Each test makes up 10% of your final grade and were open-book, so I suggest writing your notes and keeping up with the lectures accordingly.

The first assessment tested our knowledge of the first three weeks. Since this was open-book, I went into this quiz with minimal preparation and assumed that the lecture sides were sufficient. However, there was a lot of details that were explained in the lectures instead of being written in the slides. In retrospect, as the lecturer mainly tested us on her explanations, noting down everything important would have proved as a more effective studying technique. Having noticed this, I found the second assessment much easier than the first, as I prepared more for the it with more concrete notes.

End-of-semester exam

There wasn't as much practice available for this subject compared to your normal math subjects, so I'd recommend becoming familiar with its contents. I found the end-of-semester exam much harder than the sample paper and the assessments, so don't take this subject lightly just because it's open-book and multiple choice. Tanya and the teaching coordinators emphasised how this subject isn't just about memorising; In my opinion if you are someone who can easily memorise content, you will have an added advantage over other students. That said, the majority of the questions tested us on the understanding of the content itself, instead of our knowledge of the textbook.

COMP10001 Foundations of Computing [SM1]

Lecturer(s)	Prof Tim Baldwin
	Dr Nic Geard
	Ms Marion Zalk
Weekly contact hours	3 × 1-hour lectures
	1 × 1-hour tutorial
	1 × 1-hour workshop
Assessments	Weekly Grok Worksheets 10%
	40-minute Grok-based mid-semester test in Week 8 10%
	Individual project 1, due in Week 9 15%
	Individual project 2, due in Week 12 15%
	2-hour and 15-minutes end-of-semester exam 50%
Additional Information	There is a hurdle requirement of 30/60 marks across the mid-semester test and end-of-semester exam.
Textbook recommendation	None
Lecture capture	Full (both audio and video)
Year and semester reviewed	2020 Semester 1

Comments

COMP10001 Foundations of Computing (FoC) is an introductory subject on programming and the basics of algorithmic thinking, taught with Python 3. As the subject does not expect students to have prior knowledge in computing, everything is taught from scratch with the help of a highly interactive online programming platform, **Grok**. Therefore, for those of you who are completely unfamiliar with computing but are interested in gaining some basic knowledge in it, do not hesitate to take up this subject as you will be guided through the fundamentals step by step.

A considerable amount of effort and time is required to score well in the subject. However, I believe it is engaging and enjoyable enough for most of you to put in the effort voluntarily and is definitely a breadth subject worth taking! The coolest part of the subject is that, if you manage to complete all the required worksheets or the projects, bonus marks are rewarded to those who also successfully completes the bonus worksheets and questions. This gives us a chance to compensate for any lost marks during our assessments.

Subject content

- **Week 1**: Introduction to Computing and **Grok**; Programming Basics
  - Introducing the building blocks of programming
- **Weeks 2-9**: Python Fundamentals
  - Covers the Python basics such as functions, methods and loops and different data types like lists, tuples and dictionaries. Later, we were introduced to the different bug types and the general approach to debugging. Then, we were taught how to write, read and open normal and CSV files using input/output operations. Recursion was the last topic being covered under the Python Fundamentals.
- **Week 10**: HTML; Algorithm Fundamentals and Families
  - Introduces the simple mark-up language of HTML, allowing us to form lists and tables. Also covers the basics and the different approaches of algorithms.
- **Week 11**: Computational Counting; Digital Representation; Fairness and Ethics

– Covers the conversion between decimal, binary, octal and hexadecimal numbers. Also discusses about different types of text document encodings. The last topic, Fairness and Ethics, talks about the professional conduct and dual use of computing.

Lectures

Initially, the on-campus lectures were split into two streams, before transitioning to recorded online lectures in week 4. Lecture slides were posted the night before their corresponding online lectures were uploaded on Canvas.

Lectures in the first eight weeks of the semester were delivered by Tim, mainly covering topics related to the fundamental concepts and building blocks in Python to construct simple programs. Tim would split the lecture into 2 recordings, the first one being announcements and the second being the lecture content itself. Personally, lectures in these weeks were easy to follow coupled with the weekly worksheets on **Grok**.

For weeks 9 and 10, lectures were delivered by Nic, covering contents such as CSV files, recursion and the basics of HTML. Similar to Tim, Nic would also split the lecture into several recordings, each corresponding to a specific topic covered in that lecture. I found recursion to be the most challenging topic in the subject as the concept of breaking the problem into the same problem with smaller input was quite difficult to grasp. Fortunately, during the exam, instead of asking you to write a code using recursion, they would only test on our understanding of the concept behind it.

During the lecture, both Tim and Nic would typically start off by briefly introducing and explaining the concepts before discussing the in-class exercises. It is recommended that you pause the lecture recording and attempt the exercises on **Grok** yourself before proceeding to watch the solution suggested by the lecturers.

Tutorials and Workshops

All tutorials went fully online on Zoom starting from week 3, with a tutorial recording being made available on Canvas each week. In the tutorial recordings, the tutor would go through each of the tutorial questions and provide explanations for the solutions. Even though students would not be able to answer the questions or interact with the tutor during such recordings, you could still participate in any of the live Zoom tutorials. I did not attend the live tutorials and simply relied on the recordings and the solution sheets as I found it more convenient to go through them at my own pace.

Originally, we were also supposed to attend a separate weekly workshop, where its main purpose was to allow students to ask **Grok** or project-related questions. Students would attend the workshop together with around 30 other students in a computer lab. However, it was completely cancelled during the studying-at-home period. Though if you have any questions regarding the **Grok** worksheets, I would highly recommend you make use of the tutoring help on the **Grok** platform or post your questions onto the forum! The forum is a space where students are allowed to post general questions and interact with other students by answering their questions, if you are able to and would like to help out. The tutors were very helpful and responsive, usually answering the questions on the same or following day. Besides that, I found that most of the time the questions I had in mind would already be asked and answered by other students on the forum.

Grok Worksheets and Projects

There was a total of 18 **Grok** worksheets this semester, usually with 2 or 3 due each week. Each worksheet consisted of notes and exercises (in the form of diamonds). The notes would first introduce you to contents related to the topic covered in the specific worksheet. You would then be asked to complete exercises revolving around the concepts introduced and achieve the green diamonds after passing all the tests in the exercise. To me, **Grok** worksheets were the most enjoyable part of the subject as achieving the green diamonds kept me engaged in the subject and the notes were also easy to follow and understand. Therefore, by putting consistent effort into completing the worksheets, you would already have scored an easy 10% of the subject!

Apart from the weekly **Grok** worksheets, there were two individual projects to be completed during the semester, each contributing 15% to the subject's final marks. Each project was broken down into four to five parts and there would be one

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bonus question at the end. Since we were given around five to seven weeks for each project, many students only started attempting the projects a few days before the deadline. A lot of them actually posted on the forum around the deadline of project 2 saying that they found the last diamond too challenging and almost impossible for them to complete within such a short period of time. Therefore, I would advise students to start attempting the projects earlier, even if it just meant getting yourself familiar with the questions and not leave it to the last minute.

Mid-semester test

Unlike previous years, this year's mid-semester test was run on **Grok**. The test was 40 minutes long and there were 4 questions in the paper, for a total of 40 marks. Before the day of the mid-semester test, a practice test was made available for us to familiarise ourselves with the format and structure of the test.

The questions given in the mid-semester test were related to code interpretation and code generation, such as writing a single expression that satisfies certain conditions to generate a specified output and rearranging lines of a function. As long as you consistently put in the effort and keep up with the lectures, tutorials and worksheets, you should be able to perform well in the test.

End-of-semester exam

Similar to the mid-semester test, the end-of-semester exam was also being run on **Grok** with the same format. Except that there were 9 questions in total, adding up to 120 marks. Rather than just having two sections, an additional section on conceptual questions was tested. A dry-run final exam was again made available for a few days before the actual exam took place.

Overall, the final exam was not too difficult as we would have been familiar with the concepts and style of questions. However, I did find two questions under code generation to be slightly more challenging than the rest. One of the questions required us to fill in the missing lines of code in a function and I took the majority of the time trying to figure out the purpose of the function. To tackle such questions, it was useful to look for the links between the missing lines and the rest of the code as there would often be hints. Besides, I found it helpful to attempt the past year papers, which were uploaded onto Canvas, even if the format was slightly different as the style of questions were very similar. So definitely attempt those past year papers and do not hesitate to post your questions on the forum if you are stuck!

COMP10002 Foundations of Algorithms [SM2]

Lecturer(s)	Prof. Alistair Moffat
	Dr Artem Polyvyanyy
Weekly contact hours	3 × 1-hour lectures
	1 × 2-hour workshop
Assessments	3× Online quizzes 3 10%
	Individual Assignment 1, due in Week 8 20%
	Individual Assignment 2, due in week 12 20%
	1-hour 15-minute end-of-semester exam 30%
Additional Information	This subject is only available for students who are completing the *Diploma of Computing* or able to achieve the programming competency prerequisite.
Textbook recommendation	Moffat, A. (2012). *Programming, Problem Solving, and Abstraction with C, Revised Edition.* Pearson. ISBN 9781486010974
	√ Recommended, especially as a useful revision material closer to the exam period. It is an extension of the lecture slides as most of the content in the lecture slides come from the textbook, which covers the concepts taught in more details.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2020 Semester 2

Overall Comments

COMP10002 Foundations of Algorithms (FoA) is a continuation from COMP10001 *Foundations of Computing* (FoC). It is a prerequisite for most of the second and third-year computing subjects and uses the programming language C. Students are encouraged to download a compiler and code editor early in the semester to familiarise themselves with the programming environment on their laptops.

An important thing to note is that due to the structure of the Bachelor of Commerce, students can only take a maximum of 125 points of Level 1 subjects. Therefore, unless you plan to enrol in the *Diploma in Computing*, you would need to replace ACTL10001 with COMP10001 in order to achieve the prerequisites for this subject (unless you can enrol with the programming competency pathway).

Overall, I found COMP10002 challenging yet fun. It has enabled me to learn and think about the different approaches and algorithms when solving a problem. Although it took me some time to get used to not coding on **Grok**, I soon appreciated the accessibility of programming using a code editor and compiler.

Subject Content

1. **Introduction to Algorithms; Introduction to C Programming**
2. **Selection, Iteration and Abstraction in C**: Introduces the precedence of operators in C programming, the different types of loops and functions.
3. **Functions and Pointers**: Discusses how we can call and pass variables into a function.
4. **Arrays and Algorithms**: Introduces arrays and pointer variables.
5. **Analysis of Algorithms**: Discusses the efficiency of algorithms using the Big O notation. Introduces the algorithms and efficiency behind binary search and quicksort.
6. **Strings and Pattern Search Algorithms**: Introduces the different string and pattern search algorithms such as sequential pattern search, KMP search and BMH search.

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7. **String Search Algorithms (cont.) and Indexing Data Structures**: Continuation from Week 6's lectures. Introduces indexing and suffix array construction.

8. **Structs, Dynamic Memory and Linked Data Structures**: Delves deeper into the usage of pointers and introduces the concept of dynamically allocating memory that is sized according to run-time values. This is personally the most challenging topic in the subject as I find the extensive use of pointers very complex.

9. **Linked Data Structures (cont.), Binary Search Trees, Function Arguments, Modules**

10. **Files, Number Representations**: Introduces different file operations, such as writing, reading and appending.

11. **Number Representations (cont.), Problem Solving Techniques**: Discusses the different types of number representations, such as binary numbers with their integer and floating-point representations.

12. **Dictionary and Priority Queue Structures; Hashing; Mergesort and Heapsort**: Introduces more sorting algorithms that have time complexity of O(nlogn).

Lectures

Alistair and Artem took turns delivering the lectures. Both of the lecturers were very passionate and I often found the lectures interesting since they discuss many sample programs introduced in the textbook. Besides just showing the code and how it runs, sometimes the lecturers would prepare an excel spreadsheet to go through how the program or algorithm works step by step, which helped me visualise the concept better.

One key thing to note is that the lecture slides only covered the basics and do not include much details. Therefore, Alistair always stressed the importance of reading the textbook to get a better understanding. I personally annotate my lecture slides as I go through the lecture captures and only read a few chapters on the topics that I found challenging closer towards the exams.

Tutorials/ Workshops

In the weekly 2-hour online workshops, tutors usually went through the allocated exercises that week and recap contents that were covered in the previous week during the first hour. My tutor broke us out into breakout rooms to come up with solutions for some of the questions before discussing together in the main room. Although there were no tutorial recordings, pre-workshop videos that covered the overview of some concepts and some **Grok** exercises are posted up at the beginning of each week. Videos going through the solution to the **Grok** exercises were also made available at the end of the week.

In the second half of the workshop, students were given time to work on their own codes. If you encounter a problem, you could always use the "tutoring help" function on **Grok** or "raise hand" on Zoom to ask for help. I personally found it very helpful to attend workshops since we were given a chance to discuss the concepts with other students, which helps to solidify our understanding.

Online Quizzes

There were three online quizzes this semester, each of them contributed 10% to the final marks and was 30 minutes long within a 45 minute time window, taken via the LMS. The quizzes are closed book assessments, and without any use of gcc/**Grok** permitted. Each quiz included five multiple-choice content question and one function writing question. As long as students keep themselves up-to-date with the lectures, the quizzes will not be too challenging.

Assignments

There were two individual assignments, each contributing 20% to the final marks. Each assignment was broken down into three stages, which guided us to progressively develop a full program. The stages were usually dependent on each other, so it was encouraged to tackle them step by step. We had two and a half weeks to complete each assignment. The first assignment tested our knowledge on functions, sorting and displaying data. Whereas the second assignment tested us on utilising dynamic memory allocation, pointers and linked lists.

Both assignments required us to combine the concepts and techniques learned during the lectures and were challenging yet very stimulating. Marks were allocated based on the program presentation, execution and structure, and approach of

the code. By putting in enough effort and starting early, it is very doable to achieve high marks for both the assignments.

End-of-semester Exam

In the final exam, students were given an hour writing time with 15 minutes of reading time. Although no past exam papers were provided due to the different exam format this year, a practice exam which highly resembles the final exam was provided in the first week of exams. The exam was separated into three sections: short answer, programming and algorithms. Each of the section contributed 10 marks to the final exam. The exam was heavily focused on the latter parts of the subject content, covering trees, pointers and algorithms. These topics were barely included in the quiz and hence students might tend to overlook. Therefore, I would advise students to go through these topics in more detail to familiarise themselves with the concepts.

Finance Electives

FNCE20005 Corporate Financial Decision Making [SM1]

Lecturer(s)	Dr Chander Shekhar
Weekly contact hours	1 × 2-hour lecture
	1 × 1-hour tutorial
Assessments	Tutorial Participation 10%
	Mid-semester exam in Week 5 20%
	3-hour end-of-semester exam 70%

Additional Information This subject is a required prerequisite for the two core FNCE subjects (Investments and Derivative Securities) to double major in *Finance* with *Actuarial Studies*

Textbook recommendation	Peirson, G., Brown, R., Easton, S., Howard, P., & Pinder, S. (2015). *Business Finance* (12th ed.). North Ryde, AU: McGraw-Hill.
	X I do not believe the textbook is necessary.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2020 Semester 1

Comments

Overall, I enjoyed this subject very much given its grounding in real-life and focus on decision making (hence the name I suppose). The content was stimulating and easy to absorb if you have an interest in the world of finance. Some of the concepts Chander touched on were initially counter-intuitive or perplexing, however one could often get to the bottom of this by reflecting on lessons taught in PoF or even accounting subjects such as ARA or Introductory Financial Accounting. Finally, Chander always includes additional resources and articles about the covered content. While these are not examinable, they do allow you to make some interesting connections between the content and deals you see in the media.

I would definitely recommend this if you are interested in developing a more holistic understanding into the world of finance!

Subject content

1. **Introduction and Options**
   - This section offers a deeper look into options. It is a useful refresher and also lays the foundation for future topics in *Real Options and Risk Management*. It is important to understand the hedging benefits of options, how certain phenomena influence pricing and the relevant payoffs to different stakeholders.
2. **Raising capital: Equity**
   - This topic offered a comprehensive overview into equity raisings and was quite content driven, describing the motivations for different approaches. While Chander includes a lot of empirical research here, the main study to prioritise concerns of and rationale behind under-pricing.
3. **Debt and Leases**
   - This topic provided an insight into why firms may decide to lease assets instead of purchasing them outright, and how to evaluate this decision via incremental NPV analysis. Ensure you have a clear understanding as to how incremental value is derived by the lessor and lessee.
4. **Payout Policy**
   - This section investigates a more realistic look into how firms decide to utilise excess cash rather than the

Modigliani and Miller (M-M) propositions covered in *PoF*. Whilst M-M is introduced as a base case, you learn about how firms can look to reward shareholders and implications of these strategies for different parties. Ensure you understand the process of a share buyback, notably the impacts that the imputation system has on this and the motivations for choosing between stock buybacks, dividends and reinvestment.

5. **Issues with WACC and Capital Structure Policy**
   - This topic introduces a suite of different theories that offer insight into the debt-equity make up of a firm. In addition to WACC learnt in first year subjects, you must pay extra attention to the influence of taxes and the need to lever beta, allowing the relative risk measure to account for the firm's financial risk. The main point to understand in this topic is the trade-off between using debt (tax benefits, lower cost but higher financial risk) and equity (expensive to issue, higher returns expected, no tax benefits but minimal financial risk).

6. **Advanced Topics in Capital Budgeting: Sensitivity, Break-Even and Decision Trees**
   - Sensitivity analysis is simply NPV analysis but changing one variable at a time based on different sentiments and viewing the consequences of doing so. Break-even analysis, as the name suggests, involves letting NPV equal 0 and noting how much a certain variable would have to change for this to occur. Finally, decision trees allow you to map out potential decisions you will encounter and calculate the benefits of pursuing the best pathway.

7. **Advanced topics in Capital Budgeting: Real options**
   - This is a direct continuation of decision trees, however incorporating a sense of optionality in making decisions: you do not have to fully go through with a project if it is initially unsuccessful. Value is therefore derived from being able to make this decision in the future.

8. **Analysis of Takeovers: Part I**
   - This topic is a comprehensive introduction to the types of mergers & acquisitions and techniques to value targets. The valuation methods are *intrinsic valuation* (discounted cash flow models), *relative valuations* (multiples and comparable methods), *contingent claim valuation* (viewing the takeover as a real option). Make sure you understand the economic rationales of performing a takeover, namely the synergistical benefits.

9. **Analysis of Takeovers: Part II**
   - This topic continues on from the previous lecture and offers a greater insight into how companies fund such ventures. It is imperative to understand the differences between cash and scrip bids and the incentives behind each. There is also an introduction to governance and regulation. This gives an insight into the hurdles encountered through the engagement process and how different engagements can look from a legal standpoint.

10. **Corporate restructuring**
    - This topic ran through the reorganisation of businesses that make them more profitable. The most important thing is to understand the different types of business (divestitures, spin-offs & equity carve outs) and financial restructurings (management buyouts, leveraged buyouts and debt restructuring). A good way to remember these is by drawing diagrams outlining the old and new structures of the business after undergoing restructuring.

11. **Risk Management**
    - Risk management offered a brief look into how firms manage uncertainty. The main thing here is to understand that risk is not a bad thing, it is how firms become profitable. However, risk should be controlled in a manner that limits downside losses without inhibiting upside gain. Techniques covered include hedging through derivatives and Value at Risk measures.

Lectures

Chander creates quite comprehensive slides. However, it is important you have your own set of notes that cover the main ideas he brings up, as these slides are quite dense. You will quickly notice that he places a great emphasis on understanding the motivation and incentives of particular alternatives, so ensure you have these noted. He will often include what he terms "dubious reasons", which are points that may seem valid on surface level but are not supported in theory or in practice. It is important that you flag these and understand the rationale behind them as they are often

embedded into multiple-choice or true/false questions on assessments. Chander also puts a set of general questions at the end of each lecture. Ensure you have an idea of how to answer each of these as they act as a good method of revision.

Tutorials

The tutorial structure is very similar to PoF in that one half of it is to be completed prior to and submitted at the start of class. Each tutorial worksheet you submit that is deemed to be a "reasonable effort" will equate to 2%, which contributes to a maximum of 10% of your final mark. This means you only have to submit 5 in total to secure full tutorial marks.

The tutorials themselves are useful as a foundation, however, do not rely on them to prepare you for the exam as they are generally quite basic. There are often points of discussion or evaluation which can be quite useful for consolidating and justifying your understanding. This is particularly important in the 'true or false' portion of the final exam.

Mid-semester test

Multiple-choice out of 20 marks. Most questions will have a "none of above" or "more than one of above option", hence it is imperative that you understand the content as it will not be enough to simply take educated guesses. The weighting is generally spread equally across all of the covered lectures, so ensure you are comfortable with each of the topic areas.

End-of-semester exam

Part A (40%):

This section included 10 multiple choice questions worth 4 marks each. This section was particularly brutal as you either received 4 marks or 0 marks. For each question, you need to have chosen true or false correctly and accurately justified it. They also provided a rough limit of 200 words in your justifications, so try and be succinct in your responses. The content relates to every topic and sometimes requires calculations, so ensure you understand each topic's relevant formulas

Part B (60%):

This section involved 7 questions with varying marks. While it may be tempting to be extremely pernickety in section A, it is important that you move onto this section quickly as a lot these are time consuming. A lot of fiddly calculations means you must be confident on your calculator and ensure you do not combine too many steps.

We only had one practice exam offered to us, and it was significantly simpler than the final. Other past exams can be found through the library or StuDocu. As mentioned, the tutorials are not really sufficient to prepare for the final exam, as they are quite short and basic. I would encourage you to use online resources in addition to your reflections, such as Investopedia and the Corporate Finance Institute to explore the intuition of topics further.

FNCE20005 Corporate Financial Decision Making [SM2]

Lecturer(s)	A/Prof Sean Pinder
Weekly contact hours	1 × Online module
	1 × 1-hour tutorial
Assessments	1-hour mid-semester test in Week 6 20%
	3-hour end-of-semester exam 80%
Additional Information	This subject is a required prerequisite for the two core FNCE subjects (Investments and Derivative Securities) to double major in Finance with Actuarial Studies
Textbook recommendation	Peirson G, Brown R, Easton S, Howard, P and S Pinder.(2015). *Business Finance, 12th edition*. McGraw-Hill.
	Sean continually reiterates that the lecture slides are sufficient and that students should use the slides to guide any further reading, so I never felt a need to use the textbook.
	X Would not recommend.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2020 Semester 2

Overall Comments

FNCE20005 Corporate Financial Decision Making is a core subject for Finance majors and seeks to develop further topics covered previously in *FNCE10002 Principles of Finance* such as capital structure and capital budgeting. The subject covers 10 topics across corporate finance, with each topic following on from the previous topic to some degree. Overall, I found that this subject provided me with a very solid overview of the corporate landscape scene and placed many of the things I have read in the Australian Financial Review into perspective. For those with an extra breadth or elective slot, I would recommend taking this subject for this very reason. Sean is also a fantastic lecturer and makes the course as enjoyable as possible.

Subject Content

1. **Options**
2. **WACC and Capital Structure Policy**
3. **Raising Capital — Equity**
4. **Raising Capital — Debt & Leases**
5. **Payout Policy**
6. **Sensitivity, breakeven and decision tree analysis**
7. **Real options**
8. **Takeovers**
9. **Corporate restructuring**
10. **Risk management**

For the most part, the content in this subject is very theoretical and conceptual. Sean often ties in empirical evidence and real-world examples into the lecture slides, which helps to contextualise many of the topics. The only calculation heavy topics are Topics 6 and 7 to a degree. Make sure that you focus on understanding the logic and concepts behind all these topics since this is what will be tested more than anything. It is imperative that you take note of what Sean says during the lectures since it is logic that appears most on exams.

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Lectures

All lectures were delivered online this year in line with COVID-19 restrictions. Overall, Sean's lectures were very informative, and he was a very knowledgeable and enthusiastic lecturer. The lecture slides are content-heavy, but this meant that you had almost complete knowledge of everything that would be assessed. I found it effective to annotate Sean's slides with insights that he would provide over the recording. Sean would also include "Key Takeaway" slides after each concept, which I found incredibly useful for revision going into the mid-semester test or exam.

Tutorials

Due to the unique nature of online learning, tutorials were not compulsory this semester. Despite this, I would still recommend attending them virtually since you have paid for them and there is no harm in listening in over Zoom. Personally, my tutor was great at going over the previous week's content and reinforcing the knowledge that I had learnt about in that week. He would also go over the tutorial questions, but I would recommend having a look at them before the class so that you are more easily able to understand the solution.

Mid-semester Test

This year's mid-semester test was administered online on Canvas, which meant that it was open book, unlike previous years. The test consisted of 20 questions covering Topics 1–5 and lasted for an hour. Despite being online, I did not find any noticeable increases in the level of difficulty. As is commonly the case with finance multiple-choice exams, the options are set to be as tricky as possible to really test your understanding of the content. The best way to study for the mid-semester test is to go through the lecture slides and really consolidate your understanding, before reviewing some of the tutorial questions from previous weeks.

End-of-semester Exam

The end of semester exam lasted 3 hours and comprised of 80% of your final grade. Similar to the mid-semester test, it was held online and was open book as a result. However, much like the mid-semester test again, I did not find any increases in difficulty and found that, if anything, it was easier than previous years despite being open book. Usually, Sean's exams are known for being notoriously difficult, and marks were often scaled significantly to reflect this, but this may not be the case this year. There were no surprises with the structure of the exam; Sean made everyone well aware of the exam and provided a sample exam to use as revision. Once again, theory questions dominated the exam, so it is imperative that students devote most of their revision time towards this. Only 10 of the available 80 marks were calculation based questions.

FNCE30001 Investments [SM1]

Lecturer(s)	A/Prof Antonio Gargano
Weekly contact hours	1 × 2-hour lecture
	1 × 1-hour tutorial
Assessments	Tutorial participation quizzes 10%
	Mid-semester test held in Week 8 20%
	3-hour end-of-semester exam 70%

Additional Information This subject is an antirequisite to ACTL30006 *Intermediate Financial Mathematics*. This subject is for students who do not wish to complete CM2 *Financial Engineering and Loss Reserving* with the University, and/or double major into *Finance*.

This subject is required for double major in *Finance* with *Actuarial Studies*, alongside Derivative Securities and an additional Level-3 FNCE subject.

Textbook recommendation	None, the lecture slides are sufficient as study material.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2020 Semester 1

Comments

Overall, Investments is an enjoyable subject to learn if you would like to pursue a major in *Finance*. Compared to the other level 3 subjects in *Actuarial*, this will feel somewhat like a breeze, and helps you to build some confidence while you're struggling with all the formula manipulations in Actuarial Modelling. However, I did sometimes find the terminologies used in Investments confusing, as there can be many different terms that correspond to the exact same idea. According to this, I would recommend reading more financial news to make yourself comfortable with these expressions.

Subject content

Topic 1: Security Market

1. **Capital Allocation**
   - Allocating wealth between a risky portfolio and a risk-free asset with mean-variance utility function and capital allocation line.
2. **Asset Allocation**
   - Solution of the best portfolio with two risky assets with concepts like: *Opportunity Set* of risky assets and *Minimum Variance Portfolio*.
3. **Security selection**
   - Markowitz approach to solve the optimal portfolio with many risky assets
4. **The Capital Asset Pricing Model**
   - Estimating the expected return of a portfolio under *CAPM*
5. **Multifactor models, Arbitrage Pricing Theory (APT) and Factor Investing**
   - Estimating the expected return using multifactor models under the *APT*

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Topic 2: Fixed Income Market

6. **Intro to Fixed Income and Zero-Coupon Bond**
   - Introducing features of the fixed income market and a review of zero-coupon bond, which was covered in Corporate Financial Decision Making.

7. **Bond Pricing**
   - Price coupon bonds using its yield to maturity and varying interest rates and an in-depth look at the price evolution.

8. **Yield curve**
   - Introducing three theories that explain the shape of the yield curve and the trading strategies in practice.

9. **Managing Bond Portfolios**
   - Overview of the risks in managing bonds and the measuring of the sensitivity to interest rate-risk with duration.

Lectures

Antonio claimed that he's the only one who would teach Investments "in this way" at a bachelor level; he always started each lecture with a real-world problem. For example, we would take a problem, "your boss expects the interest rates to decrease and asks you to implement a strategy that profits from this expectation", and try to solve it using the concepts learned throughout the lecture, so "you wouldn't look stupid on the first day of your internship".

Excluding the theory and pure application of formulas, Antonio spent a great amount of time in his lectures to link the topics to real-world practices, which I found it very helpful to get the intuition behind the theory and also improved my financial knowledge. For example, when illustrating the idea of the *liquidity of bonds*, he spent nearly 20 minutes manipulating a brokerage account to demonstrate how to make a transaction in practice.

Tutorials

Compared to the lectures, tutorials are more exam-focused. Due to the special situation of this semester, they were all recorded and, therefore, pretty well-structured. The key points of each lecture were summarised systematically and were followed by the corresponding exercises. The tutorial questions themselves are also good practice and can involve some concepts and terminologies which were not mentioned in the lectures. So, even though without the recording, tutorial questions were still valuable materials and I recommended you use them wisely for the exam preparation.

Mid-semester test

The mid-semester test was held online and contained 20 multiple-choice questions, to be completed in an hour. It covered the contents from the first four lectures. The questions were not hard, but did have a certain level of complexity which required you to fully understand the concepts taught in both lectures and tutorials. As long as you have sufficient preparation, you will be fine.

End-of-semester exam

The final exam was a 3-hour exam with 15 minutes reading time. There were two sections in the exam: 32 multiple-choice questions and 9 problem solving questions. Most of the problems were pretty straightforward, as Antonio is famous for being generous to give marks (from what I've experienced). So make sure to catch this chance, prepare well, and boost your WAM.

FNCE30007 Derivative Securities [SM2]

Lecturer(s)	Prof Federico Nadari
Weekly contact hours	1 × 2-hour lectures
	1 × 1-hour tutorial
Assessments	Mid-semester test in Week 7 25%
	3-hour end-of-semester exam 75%
Additional Information	This subject is required for double major in *Finance* with *Actuarial Studies*, alongside *Investments* and an additional Level-3 FNCE subject.
Textbook recommendation	John C Hull.(2016). *Fundamentals of Futures and Options Markets*. 8th edition, Pearson Education Inc.
	X I do not believe the textbook is necessary.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2020 Semester 2

Overall Comments

Overall, I enjoyed Derivative Securities very much given its grounding in real life and rigour (compared to a more content-based subject in *CFDM*). Once you start to understand the benefits of the products and think like an investor, you begin to appreciate the role of derivatives in the world of finance (even if Warren Buffet is not a fan).

I would definitely recommend this subject if you are interested in developing a more holistic understanding of the world of finance or would like to get into trading shops.

Subject Content

1. **Futures and forwards**

   In this topic, you are introduced to derivative products in futures and forwards. There is a lot of content covered in this topic. However, the three most important foundational concepts to keep in mind are the different niches between futures and forwards, the different reasons to use such securities (hedging, arbitrage and speculating) and how to construct a portfolio with them. Finally, you are introduced to the pricing of these contracts and given a mountain of formulas, depending on if the asset pays dividends, offers a yield or has storage costs for example. The most important pillar to understand is the intuition behind why these affect the relative price of the derivatives, as you will be given each of these formulas in the final exam.

2. **Options Introduction**

   The first 30 minutes of this lecture is a nice recap of *Principles of Finance* Week 12 and *CFDM* Week 1, however ensuring you understand how different variables influence option prices is integral for proceeding topics (such as volatility, time, interest rates, dividends). You are then introduced to an array of strategies that involve certain positions in options and the underlying asset. Whilst these were easy to access given the assessments were open book, in typical years you will need to know these off the top of your head. A good way to do this is to match the name of the strategy with the pay-off diagram, and then you can understand the strategy if asked (and infer the positions from that too).

3. **Options pricing**

   The final section of the course involves introductions of two ways to price options: The Black-Scholes-Merton and Binomial models. Federico does a good job of building up to these through the course and gradually rolling out different layers of the respective model to make their construction quite intuitive. The questions related to this can

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seem very focused on the number-crunching (quite fiddly calculations). However, you will not do well if you don't understand the rationale behind each step or you will likely incur silly mistakes (again this comes back to the earlier idea of grasping the effect of particular events on the prices of options).

Overall all the main theories in this subject are derived from the idea of arbitrage, so ensure you understand how to create payoff tables for a range of scenarios. The main bodies that trade derivative products are quant and high-frequency trading firms, so it is realistic to consider arbitrage in this case.

Lectures

Federico is a great lecturer and spends ample time on all the fundamental ideas. Whilst his slides seem to have been made in the early 2000s, all the information you need is usually on there. Just going through them is not enough, in my opinion, as he offers an incredible amount of value in his explanations. The slides are also filled with examples, and I would definitely recommend pausing the lecture for a while, working through the example in your head before progressing, as these types of questions will undoubtedly arise in tutorials and exams. They also assist in consolidating your overall understanding of the content. Whilst he sometimes goes overtime, it is often a by-product of him spending extra time showing you how the assets work in real life (for example showing you a real exchange or a move that features trading). Whilst you can skip through these quite quickly, keep in mind that these may be tested, so try and at least have the core ideas written down from his explanations.

Tutorials

The tutorial structure is very similar to other finance subjects, with the lecturer going through provided questions. The tutorials themselves are very useful, both to build a foundation and to consolidate understanding, so spend ample time on these. I started off by just attending the tutorials themselves, but there was often too much to go through in the 1-hour block and I didn't feel as though I was learning the content properly. Given pre-recorded videos of the head tutor were uploaded to Canvas, I ended up trying the questions myself prior and then watching his videos with a friend. Whilst this generally took upwards of two hours, I felt it was incredibly beneficial for understanding and I developed a greater level of appreciation for the content, beyond just brute-forcing calculations.

Mid-semester Test

The mid-semester test was a multiple choice quiz out of 16 marks. You are only tested on futures and forwards. Weighting is generally spread equally across all the covered lectures, so ensure you are comfortable with all the sections. These take place during your usual lecture slot, so many people thought it would be a good idea to change the lecture they were enrolled in from Tuesday to Thursday, to get more time to revise. Unfortunately, the difficulty of the Thursday test was significantly harder than that of Tuesday (Median of 7 for Thursday vs 11 for Tuesday) so that backfired for several students. Fortunately, Federico is a reasonable lecturer and scaled the Thursday session up 3–4 marks, but this is something to keep in mind.

End-of-semester Exam

While the Semester 1 exam had no Futures/Forwards content, about 35% of ours was focused on that. Accordingly, it is essential to listen to what the lecturer announces about the make-up of the exam as can change between semesters. For anyone patrolling Reddit or Unimelb Love Letters, you would have probably seen the stream of complaints after this semester's exam. Derivatives is notorious for having hard exams, but what made this one so controversial was the number of difficult questions and lack of marks allocated to the hardest parts. In some ways, I can see why this was done as students can simulate a lot of the processes via excel and then copy it in given it was open book; but equally, it disadvantaged those students that attempted to do it properly. Regardless, scaling is common for this subject (Semester 1's exam was scaled up 14 marks) so the difficulty will likely be balanced out.

Lecturer(s)	Prof John Handley
Weekly contact hours	1 × 3-hour class (lecture and in-class collaborative learning)
Assessments	Take home exam due in Week 6 10% Group assignment due in Week 10 25% 3-hour end-of-semester exam 65%
Additional Information	This subject is available as the Level-3 FNCE subject to attain a double major in *Finance* with *Actuarial Studies*.
Textbook recommendation	None needed, lecture slides are sufficient study material.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2020 Semester 2

Overall Comments

Essentials of Corporate Valuation is a well-designed subject without too much content and a moderate level of difficulty. It provides students an overall understanding of what investment bankers do when they analysing acquisitions.

Subject Content

Three valuation approaches of measuring different types of value of firms and projects were spread over 10 classes (Classes 2–11) throughout the semester.

Class 1: The framework for valuation (Not examinable)

Approach 1: Valuation using Discounted Cash Flow (DCF) — Classes 2–6 and Class 11

- **Class 2: Free Cash Flow for Equity (FCFE) model and Dividend Discount Model (DDM)**
  Introduced the concepts of Free cash flow (FCF), Unlevered free cash flow ($FFFFFF^{uu}$)and Free Cash flow for Equity (FCFE), measurements of them using financial statements and applications in the FCFE model and DDM model to value the equity value of firms and projects.
- **Class 3: Standard WACC model**
  Illustrated the Standard WACC model in detail to measure the enterprise value and unlevered value of a firm and the important assumptions of the model.
- **Class 4: Vanilla WACC model**
  Illustrated the Vanilla WACC model, the key assumptions and how to distinguish the differences compared to the Standard WACC model.
- **Class 5: Estimating discount rates for DCF valuations**
  Introduced different methods to estimate the discount rate in the DCF models. (i.e. Estimate the cost of equity using CAPM and FAMA-FRENCH, estimate the cost of debt using credit spread and estimate the beta of a stock through comparator firms.)
- **Class 6: Miscellaneous issues in DCF valuations**
  Highlighted important elements to be aware of under DCF approach - treatment of surplus assets, one-off cash flow items, estimation of taxes, risk-free rate, terminal value and forecast of future cash flows.
- **Class 11: Valuation and imputation tax system**
  Explained through the adjustments to be made in the above models for imputation.

Approach 2: Valuation using multiples — Classes 7–9

- **Class 7: Valuation using PE multiples**
  Introduced the measurement of PE multiples and how to choose PE ratios from comparator firms to be used as multiples on the firm being valued.
- **Class 8: Valuation using Other multiples**
  Measurement of multiples EBIT, EBITDA and EBITDA less CAPEX and application of these multiples in practice on corporate valuation.
- **Class 9: Where does value of the proxies in valuation come from**
  Value of the proxies of multiples is determined by the following factors: growth of the firm or project, flexibility to exercise the underlying options, value of ideas at start-ups and dilution of wealth and power when issuing new shares. Each of them was illustrated in detail.

Approach 3: Valuation using replications — Class 10

- **Class 10: Valuation using replications**
  Demonstrated the idea of replication to value complex financial securities, convertible bonds, bonds with Bull Spread Warrants, Floating Priced Options which are too complex to be valued directly.

Classes

Each class consists of a 2-hour lecture and a 1-hour collaborative learning exercise. During the lecture part, John explained the models and concepts in detail, and included demonstrations using Wall Street Journal (WSJ) and Bloomberg to obtain relevant financial information. Additionally, there are a number of extension notes on the slides which are not examinable but were interesting papers to read.

The collaborative learning exercise is usually based on a real-world case. For example, the dilution of power during the three rounds of share issuing of Facebook. John extracted data from a movie for us to do the calculations on. This made that lesson quite impressive and engaging. In order to mirror the real life practices, John paused in between the questions to allow us to attempt the problem before he walked us through. These questions are normally very practical, and it was important to do them individually to prepare for the assignment and exams.

Take Home Exam

The take home exam was equivalent to an assignment which was the simplest assessment compared to the other two. There are two questions in total, the first one being a short response whilst the second was to be done with Excel. Both of them were fairly straightforward and you should be able to find the answers on the demonstrations or the lecture slides.

Group Assignment

The assignment was to be done in groups of up to three people. The topic this year was *"Is Apple Inc. actually worth $2 trillion?"*. A couple of links to Apple's financial reports and screenshots of WSJ data was provided and we were asked to provide a 10-page valuation of the company. I personally really enjoyed this assessment because it felt like a case competition that pushes you to do a lot of research. On top of that, it provided a certain level of flexibility for you to design your own flow for the presentation. Ultimately, practical application of the assignment helped me understand the concepts learnt, whilst the research and teamwork components helped me develop valuable skills for future career development.

End-of-semester Exam

The practice exam and weekly problem sets are useful materials for final exam preparation. Unlike most of the subjects we have, Essentials of Corporate Valuation does not have tutorials and therefore, requires you to keep track on your own. The problem sets questions are not hard, so you should be able to do them on your own and understand the solutions.

The problems in these preparation materials have a similar format to the exam questions except that in the actual exam, rather than clearly stating out the direct actions you need to take, questions prefer a style such as *"What would you*

recommend the firm to do" or *"comment on this firm with the data provided".* This made the exam harder than the questions with a straightforward format that tells you what they want. Hence, you have to fully understand the concepts and be able to analyse a scenario using right concepts learnt throughout the semester.

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Economics Electives

ECON10005 Quantitative Methods 1 [SM1]

Lecturer(s)	Prof David Harris		
Weekly contact hours	2 × 1-hour lectures		
	1 × 1-hour tutorial		
Assessments	Weekly online quizzes		10%
2	× Online tests due in Week 4 and Week 8	2	10% = 20%
	Assignment due in Week 12		10%
	3-hour end-of-semester exam		60%
Textbook recommendation	QME textbook provided by University.		
	The textbook covers all the concepts taught in QM1 in far greater detail than what is required to score well in the subject. Only refer to this textbook if you are very capable in mathematics and want a deeper level of understanding, otherwise it may do more harm than good.		
Lecture capture	Full (both audio and video)		
Year and semester reviewed	2020 Semester 1		

Comments

Quantitative Methods 1 is a subject that can be taken to satisfy the quantitative requirement of the *Bachelor of Commerce* (standard pathway). It teaches the basics and foundations of probability and statistical analysis that is required for future studies in econometrics and finance.

Overall, the subject is fairly reasonable. The lectures are well structured, with each lecture covering a different topic or concept. With regular attendance in tutorials and completion of the online quizzes, most should find it quite manageable. Much of the subject is devoted to the application of the techniques and concepts, rather than conceptual understanding. That said, some of the trickier questions do test your understanding of the content but these only make up a small portion of assessment and tutors are often lenient in marking these types of questions.

Overall, the subject is not the most interesting but definitely manageable if you put in the time to become comfortable with the applications. The exam and online tests are the trickiest parts of the course, so do plenty of practice questions before going into them.

Subject content
- **Week 1**: Introduction to Statistics
- **Week 2**: Basics of probability
- **Week 3**: Bivariate probability distributions
- **Week 4**: Continuous random variables
- **Week 5**: t-distribution and binomial distribution
- **Week 6**: Introduction to statistical inference
- **Week 7**: Hypothesis testing
- **Week 8**: Confidence intervals and testing errors

This review was previously published in the edition of the *Actuarial Students' Society Subject Review*.

- **Week 9**: Comparing means
- **Week 10**: Linear regression
- **Week 11**: Statistical inference with regression

The content in this subject is manageable in terms of difficulty. The first few weeks of content is quite easy, covering concepts that students will have already seen in high school. However, from Week 4 onwards, content becomes unfamiliar as the lecturers introduce statistical inference, which can be conceptually challenging at first. However, once you are able to understand the thinking behind hypothesis testing, the rest of the content essentially becomes applying that one concept in various settings.

Lectures

With the changes to teaching in 2020 resulting from the COVID-19 outbreak, all lectures bar the first 4 were held online. Regardless, they were informative and explained the concepts concisely but thoroughly. It is encouraged that students pause throughout the lectures to fully understand the reasoning and method behind each statistical technique, as well as trying to do the calculations themselves.

Tutorials

Again, with the changes to on-campus learning, all tutorials were held online. Each tutorial ran for an hour. While my tutor did his best to engage the class despite the change, I found that it was still difficult to maintain focus, but that is something that is inevitable with remote learning. The tutorials would consist of the tutor walking through the previous week's tutorial questions, some of which were appeared on the weekly quizzes that makes up 10% of your grade overall. We had the opportunity to attempt the questions ourselves in breakout rooms, but again this was rarely successful as students were quite reluctant to talk or discuss the problems. Nonetheless, I attended all tutorials anyway as it forced me to keep up to date with the content. Note that normally the 10% quiz mark requires of both attendance at the tutorial in addition to passing the online quiz, but with the change in teaching, passing the quiz was enough to secure the marks for that component.

Online Tests & Assignment

There were two online tests, one in Week 4 and Week 8. Since the first few weeks of material are considerably easier than the latter weeks, students will naturally find the first online test to be far easier than the second. The second online test was quite challenging for many, since it covered statistical inference which can be difficult at first. The average mark for the second online test was around 13/21. Both tests contributed 5%, amounting to 10% in total.

The assignment is worth 10% and is a business report. You were required to provide recommendations to a number of potential home buyers, using statistical evidence drawn from a provided dataset to support your recommendations. The assignment is intended to be a group assignment of up to 4 members, but it is definitely manageable to complete it individually. The analysis is not particularly difficult and consists of applying the concepts learned in lectures but with more realistic data sets.

End-of-semester exam

The final end-of-semester exam was administered through Canvas and lasted for 3 hours, comprising 60% of your grade. Despite the fact that the exam was open-book, I found it to be harder than expected. The exam was quite long, and you had to spend almost all of your time typing, leaving little time to even look concepts up and go through your notes. Content-wise, most of it was quite standard and again testing the practical applications of the concepts taught in lectures. There were a few tricky questions around the central limit theorem but for the most part, the exam questions were mainly about constructing and testing hypotheses. Therefore, being comfortable with hypothesis testing is of upmost important going into the exam.

ECON20002 Intermediate Microeconomics [SM1]

Lecturer(s)	A/Prof Joshua Miller
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour tutorial

Assessments	Online mid-semester test in week 7	20%
	2 × group assignments	20%
	3-hour end of semester exam	60%

Additional Information	This subject is a core subject to double major in *Economics* with *Actuarial Studies*
Textbook recommendation	*A Short Course in Intermediate Microeconomic with Calculus* by Allan Feldman and Roberto Serrano X Not necessary Useful for further reading but not required. Lecture slides are sufficient.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2021 Semester 1

Comments

In Intermediate Microeconomics, you learn about the basic building blocks of modern-day microeconomics. Compared to the first-year Introductory Microeconomics subject, there is somewhat less graphing, and significantly more mathematics and economic intuition involved. However, the mathematics should be very manageable for most actuarial students. There are plenty of real-world applications sprinkled throughout the semester.

Overall, it is quite an easy subject and should definitely be considered if you are interested in Economics or looking for a simple Commerce elective.

Subject content

Overall the content is not conceptually difficult, especially for those who are competent in maths. Almost all of the content is mathematical in some way or another, and there is very little analysis beyond the pure mathematics of the concepts. There is not a lot of content in this course so students should be focusing on being able to work through the mathematics and developing familiarity with the types of functions that are commonly seen in the tutorial questions.

1. **Consumer Choice**
   - The first 4 weeks of the semester looks at how consumers behave under a set of given assumptions. This later expands into the derivation of the demand curve and other interesting characteristics of goods.
2. **Consumer Behaviour**
   - . This builds on the knowledge of the first topic and varies certain assumptions to introduce the concept of consumption across time periods, exchange economy, and uncertainty.
3. **Firm Behaviour**
   - The second half of the semester looks at how firms make their production decisions, such as labour vs capital, profit maximisation. Specifically, you will re-learn how firms set their prices in perfectly competitive markets, oligopolies as well as monopolies.

Lectures

This semester, there are two one-hour lectures delivered every week. At the start of the lecture, there is usually some real-world link made or question proposed to introduce the content later learnt. Some people found the applications quite interesting while others found it quite confusing. It was Joshua's first semester teaching the subject and I found him to be a capable lecturer. He clearly understands the economic intuition very well and has no problem articulating it.

Tutorials

For each tutorial, you will have to complete a pre-tutorial sheet to which the solution will be posted later in the week. During the tutorial, there is another set of tutorial questions which are conceptually or mathematically more difficult. The answer is not published in an attempt to nudge more students to go to online tutorials.

I highly recommend you attend every tutorial given this is a great opportunity to practice the theory learnt in lectures and these questions are very similar to exam style questions.

Assignments and mid-semester test

You are required to choose your group members from your allocated tutorial and form a group of 1-4 for the two assignments. These questions are quite tricky, and some are way beyond what is taught in the lectures or tutorials. I highly recommend giving these questions a crack as early as possible, so you have some time to think about the more difficult ones.

The mid-sem test is worth 20% of the final grade and consists of 20 multiple choice questions. Some questions are quite conceptually challenging and require a very solid understanding of the economic theory behind it.

End-of-semester exam

The final exam this semester consists of just 6 questions each with 1-5 sub parts. They are either on par or somewhat harder than the tutorials questions but easier than assignment questions. One sample exam with a very sketchy handwritten solution was provided. More past-year papers can be found in the library with no solutions.

To prepare, I highly recommend going over the lecture slides and re-doing every single question on the pre-tutorial and in-tutorial sheets. If you can successfully do those questions, that should cover you for over 90% of the marks on the exam. The other 10% requires some mathematical "trickery" or deeper economic intuition.

ECON30009 Macroeconomics [SM2]

Lecturer(s)	Dr James Hansen
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour tutorial
Assessments	Group assignment, due in Week 5 8% 90-minute mid-semester exam in Week 6 20% Group assignment, due in Week 10 7% 2-hour end-of-semester exam 65%
Additional Information	This subject can be taken as a commerce elective for the *Actuarial* major or count towards a double major in *Economics*.
Textbook recommendation	Auerbach, A.J. and Kotlikoff, L.J., 1998. *Macroeconomics: An integrated approach*. MIT Press.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2020 Semester 2

Overall Comments

Macroeconomics takes a break from classical and Keynesian economics taught in its prerequisites and takes a "micro-founded" approach to answering macro questions. This subject teaches neoclassical economics — mainly in the form of the Overlapping Generations (OLG) model — to take another look at economic growth, business cycles, fiscal and monetary policies and open economies.

The maths used in this subject and outcomes learnt were intuitive; however, the use of the same model throughout the semester (often only changing one or two variables/assumptions in each topic) made learning quite monotonous. You can sometimes grasp links between concepts learnt and real life, but these were few and far between. Ultimately, this subject seemed like a preparatory for research in economics and I would not recommend this subject unless you are very interested in economics/macroeconomics or pursuing further study in economics.

Subject Content

1. **Review of Macroeconomic Research**: Recounted classical and Keynesian economics taught in earlier years and introduced neoclassical economics — the main approach taught in this subject — which uses microeconomic assumptions (household and firm optimisation) to build macroeconomic models.
2. **Introduction to the OLG model**: Builds the OLG or life-cycle model using the assumptions touched on in the previous topic and forms the basis for the rest of the semester. This topic also talks about long-run equilibrium and how the model can be adapted to simulate sustained economic growth.
3. **Real Business Cycle theory with OLG and Unemployment**: Touches on how the OLG model can be used to model short-run fluctuations in output and compares them to the stylised facts seen in empirical data. This topic also briefly introduces unemployment into the OLG model.
4. **Government Consumption and Fiscal Policies**: Introduces the Government entity into the OLG model and how different types of government intervention can affect consumer welfare and economic growth.
5. **Monetary Policy and Inflation**: Introduces money into the OLG model and discusses the neutrality and superneutrality of money.
6. **Two-country OLG model**: Models two countries using the OLG model to discuss the long-run effects of free capital flow for both economies. This topic also covers topic such as the trilemma, exchange rates and balance of payments.

7. **Epidemiology in Macroeconomics**: Although interesting, this topic felt rushed and tacked on. This topic briefly introduced the SIR model and discussed how it can be combined with the OLG model to showcase how economic decisions of individuals and policymakers can influence health and economic outcomes.

Lectures

Due to this semester's online delivery, lectures were split up into smaller subtopics and were pre-recorded and uploaded well in advance. Although some people might appreciate this format, I found that the transitions between lectures were jarring and affected my concentration. If you like to study in short 20-minute sprints, then this style will suit you.

The lecture slides are not sufficient for study. Although James does read off the slides quite a bit, he also spends a good majority of the lecture time elaborating on the concepts and providing examples. Therefore, it is helpful to follow along annotating your slides with his comments.

Tutorials

Tutorials were delivered weekly via Zoom and were generally conducted in two ways. In math-heavy tutorials, the tutor would talk us through the working out and intuition behind the formulae. Otherwise, theory-heavy tutorials involved separating into breakout rooms for discussion.

Similar to past economics subjects, you would have a tutorial sheet with a pre-tutorial section and an in-tutorial section. It is expected that the pre-tutorial section is to be completed before the tutorial, but I advise that you attempt both sections to meaningfully contribute to discussions in the tutorial.

Personally, the tutorials were the highlight of this subject. My tutor created a welcoming atmosphere that allowed students to feel comfortable sharing their cameras and facilitated engaging breakout rooms (contrasting to most other breakout room experiences this semester). Although this subject has tutorial participation marks in on-campus semesters, I definitely recommend attending tutorials regardless of this incentive. The tutorials help provide a more intuitive understanding of the models covered in lectures and will often answer questions that you did not know you needed answers to.

Assignments

The two group assignments were so easy, you would constantly question where you might have misunderstood the question. This sentiment was reflected in the high average marks (88%) and low standard deviations published for the assignments. For both assessments, you could choose your own groups and were given approximately two weeks to complete it. The assignments required you to derive OLG models (see end-of-semester exam section), plot the time trends in Excel, and comment on how your economy changes with different initial values and/or policies. The questions that required derivations and explanations are both textbook, so referring to the slides and tutorials will help you score well.

Mid-semester Exam

The format of the mid-semester exam was also similar to previous economics subjects with a true/false, short answer and long answer sections. You are given 90 minutes to read, write and submit your paper. As I had a relatively strong math background, I found this semester's MSE to be fairly straight forward and straight out of the lectures. However, two key skills that could prove useful for future exams are: your ability to take partial derivatives for variables with time subscripts; and using the method of Lagrange multipliers to optimise functions with multiple constraints.

End-of-semester Exam

The format of the end-of-semester exam was the same as the mid-semester exam's — just longer. For this semester's online exam, we had three and a half hours to read, write and submit your paper. Although the exam itself was "designed" to be completed in two hours, I felt that it was made a bit longer and harder than the practice exams provided.

The exam itself was fairly challenging compared to the in-semester assessments. Whilst the multiple-choice and short answer questions are possible adaptions of tutorial and assignment questions, the long answer questions will very likely ask you to derive the OLG model and analyse the time trends and/or equilibrium. These types of questions often follow

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the same structure:

1. Find optimal household consumption
2. Find optimal firm profit conditions
3. Solve for market clearing conditions
4. Derive the capital transition equation using 1–3

To maximise your chances of success, make sure you are familiar with performing these derivations no matter what initial assumptions you might have for the model.

ECOM20001 Econometrics 1 [SM2]

Lecturer(s)	Prof Marc Chan
Weekly contact hours	2 × 1-hour lectures
	1 × 1-hour tutorial
Assessments	12 online quizzes due every Friday 10%
	3 group assignments due in Weeks 5, 9 and 12 15%
	Tutorial attendance and participation 5%
	3-hour and 30 min reading time end-of-semester exam 70%
Textbook recommendation	None needed. The lecture slides and tutorial handouts are ample study material.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2020 Semester 2

Overall Comments

For those who set on the path of *Actuarial Studies*, 80% of the topics in Econometrics 1 are covered in the core subjects spreading over *Probability*, *Statistics* and *Actuarial Statistics*. Therefore, I would not recommend this as a value-adding subject to choose as a breath or elective in regards to the content. However, if you have done all the actuarial subjects but still wanted to maintain your skills in your final year, and are also interested in their econometric applications, you could consider taking this subject. I still found it to be enjoyable and interesting to learn.

Subject Content

- **Topic 1: Overview of Econometrics**
- **Topic 2: Probability review (covered in MAST20004)**
  Random variables, distributions, random sampling
- **Topic 3: Statistics review (covered in MAST20005)**
  Hypothesis tests, confidence intervals, sample variance and standard error, scatterplots
- **Topic 4: Single linear regression estimation (covered in ACTL30004)**
  Population regression line, ordinary least squares estimator, OLS assumptions, model fit measurement
- **Topic 5: Single linear regression hypothesis testing (covered in ACTL30004)**
  Confidence intervals for coefficient estimates, t-statistic, dummy variables, heteroskedasticity and homoskedasticity
- **Topic 6: Multiple linear regression model estimation**
  Omitted variable bias, population multiple linear regression line, control variables, OLS estimators, measures of model fits, perfect multicollinearity, dummy variable trap, imperfect multicollinearity
- **Topic 7: Multiple linear regression model testing**
  Testing joint hypotheses, F-statistic, single restriction with multiple coefficients, model specification, applications
- **Topic 8: Nonlinear regression**
  General framework of estimating and testing nonlinear regression models, partial effects, polynomial regression functions, logarithmic regression functions, interactions between independent variables, differences-in-differences and quasi-experiments
- **Topic 9: Assessing studies based on multiple regression**
  External validity, internal validity and threats to them
- **Topic 10: Time series regression (covered in ACTL30004)**

Basic structure of time series data, autocorrelations, autoregressions, basic principles of forecasting, ADL models, AIC, BIC, seasonality

Lectures

Lectures are well-designed with a fairly logical structure covering all the non-coding content. The lecture notes are ample study material which covers all the knowledge points we need to know. During the lecture, Marc delivers clear and concise explanations of the notes with annotations and highlights of the important parts. He is also very patient when providing online supports and consultations, which make the course enjoyable to learn.

Tutorials

Tutorials are mainly focusing on R programming and the interpretations of the outputs. The handouts are well designed to walk you step-to-step through every line of the code, the economic interpretations of the estimates and the estimation errors. Most of the code should also be covered in *Statistics* and *Actuarial statistics*. It is recommended to attend the tutorials if you take this course for two reasons, earning the 5% participation mark and learning the language used in economic interpretations from the tutor's explanation and interaction with other students.

Assignments

Assignments are to be done in groups up to three people of which you get to choose. All of the assignments are R based and are pretty straightforward. They do not require you to program yourself, but require an understanding of the code taught in the tutorials to identify which code should be used in the model provided in the assignment.

End-of-semester Exam

Even though you may find the maths, code and ideas quite familiar, there is some extension to a couple of the previously taught ideas and many details to be aware of. Past exam papers and a practice exam are given, which are useful material for exam preparation. However, you should only expect the actual exam to have a similar format with as these materials, not necessarily the questions, as these can be quite flexible

The end-of-semester exam was held online this semester in a quiz form. 25 questions (ten multiple choices, three short responses and two comprehensive problem-solving questions with multiple sub-questions under each) were to be done in 3 hours plus 30 reading time. The typing of formulae was a disaster and made the exam an intense experience. It was difficult to finish all the questions in time. Therefore, sufficient preparation is essential to perform well in the final exam.

ECOM30004 Time Series Analysis and Forecasting

Lecturer(s)	Prof Vance Martin
Weekly contact hours	2 × 1-hour lectures
	1 × 1-hour tutorial
Assessments	4 individual assignments during the semester 4 × 10%
	2-hour end-of-semester exam 60%
Textbook recommendation	None.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2021 Semester 2

Comments

This subject is one of the most enjoyable courses I did throughout my four-year university study. The contents are fairly easy to understand given our strong mathematical background. If you have studied some basic knowledge in Time Series prior to taking this subject, this would definitely be an insightful while chill subject for you. (i.e., you would not need that much time commitment compared to actuarial subjects)

Subject Content

The contents are well structured into four parts:

1. **Univariate Models:**
- Preliminaries   Week 1
- AR (Auto Regression) and Forecasting   Week 2
- MA (Moving Average), ARMA and ARMAX   Week 3
2. **Multivariate Models:**
- VAR (Vector Autoregression), Forecasting and Causality   Week 4
- Recursive SVAR (S-Structural)   Week 5
- No-recursive SVAR   Week 6
3. **Nonstationary Models:**
- Unit Roots   Week 7
- Cointegration   Week 8
- VECM (Vector Error Correction Model)   Week 9
4. **Volatility Models:**
- GARCH (General Auto Regression Conditional Heteroskedasticity)   Week 10
- Forecasting and Extensions   Week 11

Week 12 is revision.

Lectures

Personally, lectures are definitely the most important and joyful part of the course. Vance is the funniest lecturer I have ever met. His lectures are always engaging and entertaining. In terms of time commitment per week, I found watching lectures itself is sufficient. My experience is that having a full understanding of lecture material should be the highest priority. Regarding the structure of lectures, Vance likes to start with some hooks grabbing our attention, so students are likely to be interested in or curious about the course content. Main contents are generally followed by EViews commends and practice questions. (EViews is a statistical package for Windows, used mainly for time-series oriented econometric analysis.)

Tutorials

Tutorials were focused on consolidating concepts taught in lectures and practices using EViews. However, knowing how to use EViews is not required for the final exam which means you should be wise about how much commitment you want to put in regarding tutorial practice. That being said, assignments are where you demonstrate abilities to use EViews to complete tasks. My tutor did conduct lectures reviews in the tutorial which helped a lot for me to refresh what I learnt the week before.

Assignments

As you may have noticed, this subject has four assignments throughout the course, which is not common for actuarial students. Difficulty-wise, it should be quite manageable if you keep up with the lecture schedule. I personally did not find tutorials helpful for assignment preparation. One worthwhile thing to mention is the tight timeline of assignment schedules. You may only have a weekend between two assignments, usually no more than one week. Assignments are manageable but achieving full marks is not easy. Summary statistics for the cohort's performance in the assignments were not published. Aiming for relatively high marks in assignments should be considered as a final exam in this subject is more difficult in my opinion and counts more marks for each question.

End-of-Semester Exam

The final exam consists of three questions with four subsections each. Questions can cover all materials in lectures, tutorials and assignments. Questions were of different styles, but similar structures compared to assignments. They often require a holistic understanding of concepts of a class of methods/models. Two practice exams were supplied for the final exam. Vance made it available at the start of the semester, which means you can check it out whenever you are ready.

Concluding Remarks

Overall, this is a good subject to take as an actuarial breadth (particularly for Honours/Master's students) as it is relevant to actuarial studies while not being time-consuming and conceptually difficult like many actuarial subjects.

Appendix

Exemptions Guide

The University of Melbourne allows you to fulfil the Actuaries Institute accreditation requirements for all of the **Foundation Program** and half of the **Actuary Program** — the other half of which is obtained through the Institute. Exemptions are obtained by completing groups of university subjects with satisfactory grades, which allow you to be exempt from the exam of the corresponding Institute subjects shown in Table 4 and Table 5.

Exemption Marks

Exemption marks are used to calculate whether an exemption is awarded. These marks are calculated after the corresponding subject is graded, and is chosen by the Centre for Actuarial Studies based off the strength of the cohort and distribution of the final scores with the following formula:

$$exemption\ mark = subject\ score - exemption\ cutoff$$

From 2021, for university subjects involved in the exemption of **Foundation Program** subjects, the final subject score will be used to calculate the exemption mark; for university subjects involved in the exemption of **Actuary Program** subjects, only the score achieved in the final exam counts towards to the exemption mark. Although the exemption cut-off mark varies across cohorts, the marks shown in Table 3 can be used as a reference for the marks needed to obtain exemptions.

To secure the exemption for a particular institute subject, the weighted average of the exemption marks associated with the institute subject must be above zero:

$$exemption = \sum_{i \epsilon A} exemption\ mark_i * weight_i$$

Where A is the group of university subjects that contribute towards the institute subject. E.g. ACTL20001 and ACTL30003 count towards the CM1 exemption (and are equally weighted). These weights and groupings can be viewed in Table 4 and Table 5.

Example:

Grace would like to determine her eligibility for thet CS2 exemption.

1. She received 71, 82, 74 for ACTL30001 , ACTL30002 and ACTL30007 .
2. She calculates her exemption marks using the 2020 exemption cut-offs as -4, +9 and +4 for the three subjects respectively.
3. The weighted average of her exemption marks are: $-4*0.3333 +9*0.3333 +4\ 0.3334 = 3.0001,$ which is greater than zero.

Grace is eligible for the CS2 exemption.

Exemption Cut-Offs for 2021

Table 3: Exemption Cut-offs for 2021

University Subject		Exemption Cut-off
Non-ACTLXXXXX Subjects		73
Undergraduate ACTL Subjects		
ACTL20001	Introductory Financial Mathematics	75
ACTL20004	Topics in Actuarial Studies	72
ACTL30001	Actuarial Modelling I	75
ACTL30002	Actuarial Modelling II	73
ACTL30003	Contingencies	72
ACTL30004	Actuarial Statistics	75
ACTL30006	Intermediate Financial Mathematics	72.5
ACTL30007	Actuarial Modelling III	70
Postgraduate ACTL Subjects		
ACTL90001	Mathematics of Finance I	75
ACTL90002	Mathematics of Finance II	73
ACTL90003	Mathematics of Finance III	73
ACTL90005	Life Contingencies	71
ACTL90006	Life Insurance Models I	73
ACTL90007	Life Insurance Models II	75
ACTL90008	Statistical Techniques in Insurance	Subject not offered in 2020
ACTL90010	Actuarial Practice and Control I	66% (Final Exam)
ACTL90011	Actuarial Practice and Control II	69% (Final Exam)
ACTL90019	Data Analytics in Insurance 2	65% (Final Exam)
ACTL90020	General Insurance Modelling	70
ACTL90021	Topics in Insurance and Finance	72
ACTL90022	Economics for Actuaries	73

Source: *Centre for Actuarial Studies*

List of Core Principle Exemptions

Undergraduate Exemption Subjects

Table 4: Actuaries Institute Core Principle subjects and corresponding undergraduate university subjects

Institute subject	University subject(s)		Weight
Foundation Program			
***CM* Actuarial Mathematics**			
CM1 *Actuarial Mathematics I*	ACTL20001	Introductory Financial Mathematics	50%
	ACTL30003	Contingencies	50%
CM2 *Financial Engineering and Loss Reserving*	ACTL20004	Topics in Actuarial Studies	33.33%
	ACTL30006	Intermediate Financial Mathematics	33.33%
	ACTL40004	Advanced Financial Mathematics	33.34%
***CS* Actuarial Statistics**			
CS1 *Actuarial Statistics I*	MAST20004	Probability	33.33%
	MAST20005	Statistics	33.33%
	ACTL30004	Actuarial Statistics	33.34%
CS2 *Risk Modelling and Survival Analysis*	ACTL30001	Actuarial Modelling I	33.33%
	ACTL30002	Actuarial Modelling II	33.33%
	ACTL30007	Actuarial Modelling III	33.34%
***CB* Business**			
CB1 *Business Finance*	ACCT10002	Introductory Financial Accounting	50%
	FNCE10002	Principles of Finance	50%
CB2 *Business Economics*	ECON10004	Introductory Microeconomics	50%
	ECON20001	Intermediate Macroeconomics	50%
Actuary Program			
***ACC* Actuarial Control Cycle**	ACTL40006	Actuarial Practice and Control I	50%
	ACTL40007	Actuarial Practice and Control II	50%
***DAP* Data Analytics Principles**	ACTL40012	Actuarial Analytics and Data II	100%

Source: *Centre for Actuarial Studies* and the *Actuaries Institute*
Current as of 2nd January 2022.

Actuarial Students' Society
The University of Melbourne

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Postgraduate Exemption Subjects

Table 5: Actuaries Institute Core Principle subjects and corresponding postgraduate university subjects

Institute subject	University subject(s)	Weight
Foundation Program		
***CM* Actuarial Mathematics**		
CM1 *Actuarial Mathematics I*	ACTL90001 Mathematics of Finance I	50%
	ACTL90005 Life Contingencies	50%
CM2 *Financial Engineering and Loss Reserving*	ACTL90021 Topics in Insurance and Finance	33.33%
	ACTL90002 Mathematics of Finance II	33.33%
	ACTL90003 Mathematics of Finance III	33.34%
***CS* Actuarial Statistics**		
CS1 *Actuarial Statistics I*	MAST20004 Probability	33.33%
	MAST20005 Statistics	33.33%
	ACTL90008 Statistical Techniques in Insurance	33.34%
CS2 *Risk Modelling and Survival Analysis*	ACTL90006 Life Insurance Models I	33.33%
	ACTL90007 Life Insurance Models II	33.33%
	ACTL90020 General Insurance Modelling	33.34%
***CB* Business**		
CB1 *Business Finance*	ACCT90042 Accounting and Finance for Actuaries	100%
CB2 *Business Economics*	ACTL90022 Economics for Actuaries	100%
Actuary Program		
***ACC* Actuarial Control Cycle**	ACTL90010 Actuarial Practice and Control I	50%
	ACTL90011 Actuarial Practice and Control II	50%
***DAP* Data Analytics Principles**	ACTL90019 Data Analytics in Insurance 2	100%

Source: *Centre for Actuarial Studies* and the *Actuaries Institute*
Current as of 2nd Dece 2020.

Mathematics Prerequisites for the Actuarial major

The second-year subjects that sets the foundation for all subjects in the *Actuarial Studies* major are MAST20004 *Probability* and ACTL20001 *Introductory Financial Mathematics* — the prerequisites for every ACTL subject can be traced back to these two subjects. To be eligible to enrol in MAST20004 and ACTL20001 in your second year, you must have fundamentals in both linear algebra and calculus, shown through your satisfactory performance in the University of Melbourne subjects or equivalent.

Linear Algebra
- MAST10007 *Linear Algebra*
- MAST10022 *Linear Algebra: Advanced*
- MAST10008 *Accelerated Mathematics 1*

Calculus
- MAST10006 *Calculus 2*
- MAST10021 *Calculus 2: Advanced*
- MAST10009 *Accelerated Mathematics 2*

Whilst the requisite conditions for MAST20004 *Probability* is fairly straight forward:

- Obtaining a pass in any subject from the list of *Linear Algebra* subjects, and;
- Obtaining a mark of 60 or greater in any subject from the list of *Calculus* subjects.

Meeting the requisite conditions for ACTL20001 *Introductory Financial Mathematics* can be confusing and the Actuarial Students' Society have tried to summarise these conditions with Table 6. To meet the requirements of *ACTL20001*, you must complete one of the Linear Algebra subjects and one of the Calculus subjects, and receive a **combined mark** greater or equal to the cell that corresponds to the associated row and column.

Table 6: Requisites for ACTL20001 *Introductory Financial Mathematics*

		Linear Algebra		
		MAST10007	MAST10022	MAST10008
	MAST10006	150	150	135
Calculus	MAST10021	150	150	135
	MAST10009	135	135	120

For more information, visit the handbook entry for ACTL20001

Example:

Rose received a 68 and 83 for MAST10008 and MAST10006 respectively. As the combined score is 151 and is greater than 135, Rose can enrol in ACTL20001.

Ineligible for MAST10006/MAST10007

If you have not met the high school prerequisites for MAST10006 and/or MAST10007, you may replace ACTL10001 with MAST10005 in your study plan to meet the prerequisites for MAST10006 and MAST10007.

UMEP Mathematics

If you have completed MAST10018 *Linear Algebra Extension Studies* and MAST10019 *Calculus Extension Studies*:

- with a combined score of 150 or more, you are eligible for *ACTL20001*.
- with a combined score above 135 but lower than 150, you must pass MAST20026 *Real Analysis* to be eligible for *ACTL20001*.