SUBJECT REVIEW

2019 END-OF-YEAR EDITION

Contents

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.

Due to the change to the *Bachelor of Commerce* structure in 2017, actuarial students must take one level–2 commerce elective. With this in mind, the 2019 end-of-year edition of the *Actuarial Students' Society Subject Review* includes more of these electives to assist actuarial students in deciding the right 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.

In the 2019 end-of-year edition of the *Actuarial Students' Society Subject Review*, 2 new subjects were reviewed, in addition to updating reviews for each of the core subjects of the Actuarial Studies major. The *Actuarial Students' Society Subject Review* contains up-to-date reviews for all subjects that contribute to the accreditation process. In addition to subjects relevant to the *Masters of Commerce (Actuarial Science)* course, we have continued to include subjects relevant to the *Masters of Actuarial Science* course.

More importantly, the existing ***Part I*** and ***Part II*** programs changing to the new ***Foundation Program*** and ***Actuary Program*** is an important transition that should be carefully understood by students who are studying the *Bachelor of Commerce* actuarial stream in 2019. As the revised curricula introduce new subjects in 2020, the *Actuarial Students' Society Subject Review* aims to continue sharing up-to-date insights and experiences of actuarial students undergoing this transition. Please read more about the ***New Foundation Program*** below.

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.

About the Actuarial Students' Society

The Actuarial Students' Society is the representative body for all actuarial students at the University of Melbourne. Since being founded by actuarial students in the mid-90s, the society has been an important link between students, the university, and employers.

Our aim is to enhance the social and professional lives of our members. We help prospective actuaries build bridges and make connections with other students, mentors, and potential employers. To do this, we host an array of events throughout the year that all members of the society are welcome to attend. We provide valuable exposure to the industry at our premier event of the year, Contact Night, as well as augmenting members' professional skill sets in our popular workshops and information sessions. On the other hand, events such as Trivia Night, Poker Night, and Pool Night are great ways to make friends and have fun with fellow students and qualified actuaries in a more relaxed and informal manner.

Our sponsors are industry leaders who are always on the lookout for the best and brightest. We provide our members with information regarding internship and employment opportunities directly from our sponsors, along with many events where we can brush shoulders with practising actuaries.

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 2019 end-of-year edition of the *Actuarial Students' Society Subject Review*. Note that some contributors have asked to remain anonymous:

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Disclaimer

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.

While 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.

N.B. To avoid confusion, the 2019 end-of-year *Actuarial Students' Society Subject Review* will continue to reference the *CT* subjects instead of the new *CP* subjects; this will be updated in the next *Actuarial Students' Society Subject Review* to accompany the arrival of the *Foundation Program* and the termination of the *CT* Program.

First-Year Subjects

Contents

ACCT10001 Accounting Reports and Analysis [SM1]

Exemption status	Not an exemption subject, but is a prerequisite for ACCT10002 *Introductory Financial Accounting* (CB1 *Business Finance* subject).
Lecturer(s)	Mr Noel Boys Dr Phil Cobbin
Weekly contact hours	1 × 2-hour lecture 1 × 1-hour tutorial
Assessments	Tutorial preparation and participation 6% Assessable online tests 4% Individual Assignment, due in Week 5 10% Group Assignment, due in Weeks 11 10% 3-hour end-of-semester exam 70% As part of your tutorial preparation, there are weekly quizzes to be completed prior to the tutorial. The overall result of the quiz is not assessable but completion of it is necessary.
Textbook recommendation	Birt, J., Chalmers, K., Maloney, S., Byrne, S., Brooks, A., & Oliver, J. (2017). *Accounting: Business Reporting for Decision Making* (6th ed.). New York, US: John Wiley & Sons.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2019 Semester 1

Comments

Going into this accounting subject, 3 things become abundantly clear:

1. Noel is a great lecturer that adds a necessary flair to a sometimes mundane subject.
2. The conceptual framework becomes the backbone of almost every question you will encounter.
3. People that have studied accounting before (i.e. in VCE) will appear to know everything and not hesitate to ensure you are aware of that fact.

Noel is a great lecturer as he makes sure to move beyond the slides. He will engage you with both his humour and spontaneous analogies; a personal favourite is the time he somehow linked the balance sheet to eating goldfish. Accordingly, it was a devastating blow in week 6 when he announced that he would be leaving on long service leave. One thing you notice with Noel gone is the solid pace with which he works through the lecture slides: His replacement Phil made a valiant effort however his first lecture finished 5 lengthy slides short, while his second finished 15 mins early after skipping 4 slides that I would argue contained important notes. Accordingly, whether you choose to attend lectures or not, it is imperative to go through the completed lecture slides (released every week on Friday) in depth and ensure you understand any worked examples conducted or notes added in red. Many of these are derived from the conceptual framework and going through this process can make initially daunting problems appear much more simple. Finally, when working through initial transaction analysis, those that have done accounting in the past will know how to classify transactions almost immediately. This was personally a bit daunting initially as I had never done any accounting before and felt a bit out of my depth having to

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

work through each of these at a slow pace. Make sure this doesn't discourage you as it is imperative to understand the intricacies and reasons of every classification to succeed in this subject.

Subject content

- Week 1: Regulatory Framework / Conceptual Framework
- Week 2: Transaction Analysis & Financial Statements
- Week 3: The Balance Sheet — Assets
- Week 4: The Balance Sheet — Liabilities & Equity
- Week 5: The Statement of Comprehensive Income & Statement of Changes in Equity
- Week 6: The Cash Flow Statement
- Week 7 - 8: Financial Statement Analysis
- Week 9: Budgeting
- Week 10: Cost-Volume-Profit Analysis
- Week 11: Sustainability — Contemporary Issue in Accounting (Guest Lecturer)
- Week 12: Course Review / SWOTVAC and Exam Details

Textbook

Personally, I purchased a physical textbook second-hand however I would definitely not label it as necessary. Every lecture begins by outlining which learning outcomes from the textbook will be covered, however the slides themselves contain more than enough information, case studies and explanations of main concepts. In addition, Noel does upload a document with textbook question numbers targeted at what the lecture covered. This is useful as it allows you to only cover relevant material and he also provides solutions to these, whereas the textbook itself does not have these attached. Doing these questions did help when clarifying certain topics, however I would not mark these as essential, and they could easily be replicated by grabbing them off an online copy. Overall, a physical textbook is not a necessity and having a textbook at all is really up to personal taste. As it is a foundation accounting subject, many of the concepts are broad and consistent with many online resources/covered in the slides.

Tutorials

I had a very good tutor who converted almost every numerical question into some form of table. I found this to be extremely useful as it allowed visualisation of the process being taken, enabling an understanding of content outside of definitions. It also allowed us to comprehend how concepts fit together. The tutorial really assisted in narrowing down the lengthy lecture slides into only relevant knowledge. At times, lectures can seem like a ceaseless cascade of information with no particular progression, while the tutorials allow a sense of completeness for the new concepts.

Assignments

The first assignment involves everyone receiving a list of transactions and having to place these into a transaction analysis sheet on excel. After completion, this will be uploaded where you will receive the corrected version. This will then release part 2, where you will get an array of classifications and have to create both a balance sheet and statement of profit/loss. One thing to be wary of is formatting/presentation. Whilst they limit marks you can lose off these, evidently it would be optimal not to lose any at all. This includes bolding/underscoring the right cells. Overall a relatively simple task that helps your understanding of the subject. If you're struggling with your specific sheet, I highly recommend looking at the transaction analysis Noel spends a lecture on and trying to identify patterns or similar situations.

Assignment 2 is a group project consisting of 2 parts. Part A (3%) requires the group to complete a set of financial analysis

tasks on Excel. I would recommend each member of the group completing the entire spreadsheet individually and then comparing them together as it does not take an excessive amount of time, and doing so ensures you understand each of the analysis techniques. Ultimately however, I would encourage you to at least complete the ratio part as understanding each of these are essential for Part B and sometimes in the exam. Part B (7%) involves evaluating the financial performance of an entity in the format of a memorandum. The lead up to this is a bit vague, particularly the formatting so I would definitely recommend searching up some professional ones to nail these easy marks. As for the actual analysis, try and break it into sections such as profitability, efficiency and liquidity and attempt to create a cohesive flow between these, even the simple inclusions of linking words can go a long way into creating a sense of continuity.

Online Tests

You get 4 online test consisting of around 12-15 questions, each worth 1%. They are usually quite straight forward and shouldn't take too long. Doing the practice tutorial online questions on the LMS will prepare you perfectly for these.

End of Semester Exam

Exam Structure Breakdown

- Question 1 (35 marks): Income Statement and Balance Sheet
- Question 2 (20 marks): Cash flow statement and transaction analysis sheet
- Question 3 (25 marks): Short answer questions from a variety of topics
- Question 4 (10 marks): Budgeting
- Question 5 (10 marks): Cash Volume Profit analysis

In the lead-up, you will get access to a lot of 'exam style questions'. These are very useful for covering content and ensuring you understand it, however they can become a bit frivolous eventually as they don't really mimic the style of the exam. As you can see above, there is a huge weighting on Income statement and Balance Sheet and Cash flow statement and transaction analysis sheet so it is imperative to understand how to complete these, something not really covered in the practice materials. I would highly recommend referring to Assignment 1 to observe the formatting and required sections. Finally, look out for any conditions that could change classifications. These could affect factors such as the time horizon of an event, quantity or even whether it can be classified (once again, it all comes back to the conceptual framework!).

ACCT10002 Introductory Financial Accounting [SM2]

Exemption status	CT2 *Finance and Financial Reporting*, in conjunction with FNCE10002 *Princples of Finance*. An average of 73 across this subject and FNCE10002 *Princples of Finance* is needed, with no fails.
Lecturer(s)	Mr Warren McKeown
Weekly contact hours	1 × 2-hour lectures 1 × 1-hour tutorial

Assessments

Tutorial Participation	4%
Tutorials – Random Exercises	2 × 3% = 6%
Online Quiz (1) due in Week 3	2%
Practice Set Assignment due in Week 8	15%
Online Quiz (2) due in Week 11	3%
3-hour end-of-semester exam	70%

Textbook recommendation	Carlon, S., Mitrione, L., Kirk, N., Palm, C., Wong, L., & McAlpine-Mladenovic, R. (2016). *Financial Accounting - Reporting, Analysis and Decision Making (5th ed.)*. Milton, AU: John Wiley & Sons Australia. This is not heavily used nor referred to by Warren. Personally, the lectures and tutorials were detailed enough.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2019 Semester 2

Comments

Introductory Financial Accounting extends on many key lessons taught in ACCT10001 *Accounting Reports and Analysis*, none more so than the accounting conceptual framework. Whilst this remains the backbone of accounting, IFA covers more objective content than *ARA*, so it is therefore imperative to understand the rationale behind the journal and double-entry accounting. A lot of people I spoke to through the subject said it was very similar to the subject matter taught in VCE Accounting. Despite this, there is nothing to worry about if you had not studied this, as the first 3 weeks are spent consolidating the foundations. Personally, I only truly grasped the concept of double-entry accounting in the Statement of Cash Flows (10th week); and from there, all the other topics clicked. I could have answered questions regarding earlier weeks, however, a more sophisticated level of understanding only occurred at this (late) stage. This is due to the fact that in order to grasp this topic, you must have a holistic understanding of the Financial Statements and the interdependent nature of various line items. Accordingly, I would recommend reflecting on how each week's content relates to the greater Financial Reports so as not to have a shock in week 10. Finally, the accounting standards (AASBs) are continually referenced throughout the course, however, you do not need to know all of these in-depth for examination purposes.

Subject content

- Week 1 – Introduction, Conceptual Framework and External Reporting
- Week 2 – Double-Entry Recording
- Week 3 – Accrual Accounting and Adjustments
- Week 4 – Inventories
- Week 5 – Receivables
- Week 6 – Non-Current Assets
- Week 7 – Liabilities
- Week 8 – Equities
- Week 9 – Share Issues and Change in Equity
- Week 10 – Statement of Cash Flows
- Week 11 – Accounting for GST
- Week 12 – Course review

Lectures

9am lectures on Monday and Friday are not optimal. As a result, I am sure a majority of the IFA cohort would not be able to recognise Warren if they strolled past him. Regardless, he is a confident and relatively engaging lecturer considering the content he covers. Much of his charisma is translated over Lecture Capture and he expresses contents clearly and concisely. In addition, the slides are comprehensive – just be sure to access the completed lecture slides released at the end of each week. The lectures are generally structured with the first hour and a half going through content, before finishing off with a past exam question. These questions were really useful to consolidate what had been covered in the lecture and a good way to ensure you understood what had been taught. In this sense, it can be an advantage to use lecture capture: Once the content was finished, I would often pause the recording and attempt the questions myself before watching Warren's solution. He also tends to finish the lectures around 20 minutes early so that was always a positive.

Tutorials

Tutorial sheets were broken up into 3 sections: Must complete, should complete and may complete. Tutors are unlikely to check whether each student has finished the compulsory section, however, they may call on you for an answer when reviewing one of these questions so ensure you have at least an understanding of the content covered. There often is not enough time to go through every question in the tutorials so I would highly recommend working through the questions in your own time and then reviewing the provided solutions during the weekend. Engagement and participation were only worth 4%, however, these are easy marks so try your best to secure these. Answering the occasional question or contributing to group discussions are simple ways to ensure you can receive these marks. You do receive an interim report in the middle of the semester that shows you what mark you are on track to receive.

Tutorials – Random exercises

At various points in the semester, you will receive a random exercise that is tutorial-specific. Once again, another opportunity to consolidate your learnings. These are often quite simple to work through and easy marks to secure. Each tutorial

receives different tasks and the release dates are at each individual tutor's discretion.

Online Quizzes

These are done through Wiley. The exercises are similar to tutorial sheets, the only real constraint being the time limit. You are given marks for each section of the question you get right (i.e. for a cash flow statement, you are rewarded for every correct value, sub-heading or entry) so always enter the easiest parts first so, if you do run out of time, you have at least secured partial marks. Once again, when exam period comes around this is another good tool to use for practice questions.

Practice Set Assignment

This assignment gives you a variety of transactions, and you must enter these into the cloud-based accounting software Xero in order to create a Balance Sheet and Profit/Loss statement. A lot of people enjoyed this assignment as it was an application of theory and you were developing tangible skills. The main thing to do is give it enough time; try and start it early so you can get a grasp of Xero's different functions and classification tools. Attention to detail is key: making sure to consider discounts, write-offs, credit notes, etc. It may even be beneficial to do all the transactions by hand and create your own statements, and then compare this to the Xero outputs. Doing this will allow you to reconcile any errors as it can be hard to keep track of all your transactions in Xero (after you amend an error, it remains in the journal instead of disappearing so it can be difficult to confirm you have entered the right values). Each student has an identical first month of transactions which is valuable when learning the ropes, however, the figures differ for the second month. Overall, try and work through the first month with friends and to develop a clear process, allowing you to develop confidence when transacting through your individual figures. There are also consultations offered which can be valuable if you are struggling to grasp the system.

End-of-semester exam

The paper is out of 200, with Warren's rationale behind this being that it was a 100-mark paper that he doubled because he hates half marks. As a result, don't be daunted by the high mark allocation. There is enough time to cover all of the questions in depth if you work at a solid and consistent pace. You receive a plethora of past papers in the lead-up which are extremely valuable, the only thing to note is that there are no longer multiple-choice questions on the exam. Warren outlines the main areas to be tested in the final exam in the final lecture, so ensure you do plenty of practice in those areas and review each of the tutorial sheets. There are large mark allocations to the cash flow, and there will likely be a lengthy ethics question, something referred to in almost every tutorial.

Concluding Remarks

Many view IFA as more enjoyable than *ARA* due to the more logical and intuitive processes learned. It is more calculation based however you still have to have a deep understanding of the content to apply these calculations appropriately. Whilst it may be dry at times, try and derive value in what you are learning: assessing a company's financial position through reading their statements is valuable in many contexts, and there are fascinating considerations about the industry touched on within the Ethics sections.

ACTL10001 Introduction to Actuarial Studies

Exemption status	Not an exemption subject, but is a great introductory subject which covers the basics of the Actuarial Studies major
Lecturer(s)	A/Prof Shuanming Li
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour tutorial
Assessments	2 × Microsoft Excel group assignments due in Weeks 5 and 11 2 × 10% = 20% 45-minute mid-semester test in Week 8 10% 2-hour end-of-semester exam 70%
Textbook recommendation	Dickson, D. C. M., & Atkinson, M. E. (2011). *An Introduction to Actuarial Studies* (2nd ed.). Cheltenham, UK: Edward Elgar Publishing. The textbook is used primarily for further reference and access to more practice problems. There are no assigned readings from the textbook. Personally, I found that the lecture slides are already quite comprehensive, and the problem sets have more than enough questions for practice, so ✗ I do not recommend purchasing the textbook.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2019 Semester 2

Comments

ACTL10001 Introduction to Actuarial Studies, while not a prerequisite for second year ACTL subjects nor an exemption subject, provides a great overview of what the Actuarial major will look like. For many students like myself, this subject acts as a taster for the major and is instrumental in helping students decide whether to continue forward with Actuarial or switch into a different major. The subject itself can be tricky at times as there is a lot of memorisation of formulae, which is surprising for a very mathematical field. Regardless, with a solid grasp of the formulae and its applications, the course is fairly manageable. The theory is very straightforward so there should be no problems in that regard. Focusing on familiarising yourself with notation and formulae is the way to go with this subject.

Subject content

The first four weeks should be a breeze for everyone who completed FNCE10002 *Principles of Finance* last semester, as it is almost identical to the financial mathematics topics covered in *PoF* and should be mainly revision. That said, actuarial notation will be introduced for the first time here so ensure that you are comfortable and familiar around such notation. Again, I will emphasise the importance of memorising formulas since there is *no formula sheet* and you must rely on your own memory when asked to calculate the present value of a sequence of cash flows.

From Week 5 onwards, the subject introduces actuarial roles in life insurance and general insurance. In particular, Weeks 5 & 6 examine the demographics of life insurance and involve analysis of population pyramids, mortality experience and fertility rates. At the same time, a number of very similar concepts are introduced, including expected lifetime and complete expectation of life. Week 6 specifically can be quite overwhelming with the number of new formulae and definitions, so expect to spend more time revising content from this week. The content in the final few weeks is more theoretical in nature

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

- Week 1 — Simple interest and simple discount
- Week 2 — Effective, nominal interest rate and force of interest
- Week 3 — Annuities
- Week 4 — Bonds and loans
- Week 5 — Demography
- Week 6 — Life table and stationary population
- Week 7 — Mortality experience, fertility and population projection
- Week 8 — Valuations of contingent payments
- Week 9 — Life insurance
- Week 10 — Premium and reserve calculation in life insurance
- Week 11 — General insurance and reinsurance

and consists of analysing the many roles of an actuary in both life insurance and general insurance. The theory is not difficult here and serves as a nice conclusion to the subject.

Lectures

There are two lectures held each week, both running for an hour. Typically, a lecture would consist of Shuanming going through and annotating the lecture slides. Lecture Capture supports full recording of the lectures and as a result, I chose to watch all of his lectures online. Personally, I would always watch lectures through Lecture Capture if full recording is supported because of the convenience watching online brings, along with the ability to pause/play and speed up/down recordings at will. I found that the lecture slides were very comprehensive and detailed, and for certain weeks where content is theory heavy, it would suffice to just read the slides without watching the lecture.

Shuanming would also post a summary sheet after each week's lectures, which is a fantastic revision tool both throughout the semester and during SWOTVAC, and I recommend regularly revising using these sheets at the end of every week.

Tutorials

Unlike many other of your commerce classes, tutorials for Introduction to Actuarial Studies are not compulsory and do not count towards your grade. During each tutorial, a tutor would provide a brief recap of the week's content before explaining through a number of questions from the problem set. In my experience, the quality of tutorials was very hit or miss and depended heavily on the tutor. Some tutors were fantastic, providing additional insight and offering new perspectives which in turn improved our understanding dramatically. On the other side of things, other tutors would simply read off the solutions which I'm sure everyone is more than capable of doing themselves. Because of this, at one point there were almost 30 students in one room, resulting from students leaving their enrolled tutorial to attend a tutorial run by a different tutor.

Group Assignments

There are two group assignments throughout the semester, both of which must be completed in groups of 3–4 and on Microsoft Excel. The first assignment covered material from Week 1 to Week 4 and was very manageable. Students should aim to score almost full marks on this assignment. The second assignment was more difficult as it covered trickier topics from Weeks 6 to 10 but should be fairly doable. These assignments are short enough for each group member to complete individually, so I suggest doing so and then comparing afterwards to minimise the chances of making careless errors.

Mid-semester test

The mid-semester test was 30 marks with a time limit of 45 minutes. Overall, the test was fairly difficult. It is very easy to make a mistake with many of the questions due to the many numbers and calculations involved, so be especially careful when entering figures into your calculator. As recommended in previous subject reviews, the memory function on the Casio FX-82 calculator is incredibly useful and saves plenty of time.

End-of-semester exam

The end of semester exam was worth 70 marks for a two-hour exam with 15 minutes reading time. Problems were mostly application and practical questions, with a few marks on theory. Two practice exams are provided on the LMS, but I found that the actual exam was considerably easier. Most students had similar thoughts and also found it very reasonable. Again, make sure you know your formulae and take care around entering numbers into your calculator.

Concluding Remarks

Overall, this subject does a fantastic job of introducing the Actuarial course. It is a great way of checking whether Actuarial Studies is really for you since it gives you a solid idea of what is to come should you continue forward.

ECON10003 Introductory Macroeconomics [SM2]

Exemption status	Not an exemption subject, but it is a prerequisite for ECON20001 *Intermediate Macroeconomics* (CT7 *Business Economics* subject)
Lecturer(s)	Dr Lawrence Uren Ms Nahid Khan
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour tutorial
Assessments	2 online multiple-choice tests in Weeks 4 and 11 — 2 × 5% = 10% 2 assignments due in Weeks 6 and 10 — 10% — 2 × 10% = 20% 2-hour end-of-semester exam — 60%
Textbook recommendation	*Principles of Macroeconomics*, Fifth Edition, by Bernanke, Olekalns, Frank, Antonovics and Heffetz, MacGraw Hill. I personally ✗ do not recommend purchasing it; Lawrence's lecture notes and recordings were sufficient. However, I did borrow the textbook from the library while completing the assignments for additional reference and deeper understanding.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2019 Semester 2

Comments

Introductory Macroeconomics is an interesting and exciting subject which has garnered my interest for various macroeconomic phenomena. The macroeconomic models introduced were also fairly intuitive although I personally found the content slightly challenging at first, as the concepts being covered were all new to me. However, all the topics started to make more sense once I noticed the links and patterns while solving tutorial questions and completing assignments. Besides the topic *International Trade*, which I found to be slightly similar to what I have learned from *Introductory Microeconomics*, this subject is quite different from other subjects in Semester 1, as it explores how markets that operate on a large scale behaves.

Subject content

- Week 1: Introduction to GDP
- Week 2: Inflation and Interest Rates & Savings and Investments
- Week 3: The Labour Market & Short-term Economic Fluctuations
- Week 4: A Keynesian Model of the Macroeconomy
- Week 5: Fiscal Policy & Financial Markets and Intermediation
- Week 6: RBA and Monetary policy & Aggregate Demand and Supply
- Week 7: Aggregate Demand and Supply

- Week 8: Introduction to Economic Growth & the Solow-Swan Model
- Week 9: Empirics of Economic Growth & International Trade
- Week 10: International Trade & Exchange Rates
- Week 11: Exchange Rates & Balance of Payments
- Week 12: Balance of Payments

Lectures

There are two one-hour lectures every week and I attended Lawrence's lecture stream for the first half of the semester. The reason why I stopped attending lectures afterwards was that watching Lawrence's lecture recordings were more efficient for me as I could slow down on parts I found more challenging. I could also pause the recordings and do additional research online if I couldn't understand a concept. Though I am not trying to discourage you from attending lectures, I definitely recommend using the lecture capture as a way to consolidate your understanding!

The lecture slides used by both lecturers are the same. Since they upload their own annotated slides onto the LMS after the lectures, you do not need to worry about jotting down notes precisely on the spot. Overall, Lawrence's lectures were very well structured, concise and easy to understand. It would be helpful to watch his lecture recordings while doing revisions!

Tutorials

Tutorials commence in the second week of the semester. 10% of your final mark is awarded for tutorial participation in this subject, therefore it is highly recommended to attend them as these marks are pretty easy to score.

Every week, a pre-tutorial worksheet will be posted on the LMS and you will be expected to complete them on your own. Make sure you write the answers down on a piece of paper or your tablet and bring it to tutorials as your tutor might check on it. If you are unable to provide your answers, you might only receive half the participation marks that you would receive from that tutorial. Brief solutions to these questions will be posted at the end of the week on the LMS.

Additionally, you will also get an in-tutorial worksheet for you to complete while working with other classmates during the tutorial. The tutor might split the students up into groups of 5 or less and each group will be asked to discuss certain questions from the tutorial sheet. Each group will then take turns to share their answers. The questions asked are, for the most part, very similar to the pre-tutorial worksheet and are closely related to the content covered in the previous week. Solutions for the in-tutorial sheet will not be posted on the LMS so you should write down the answer shared by your tutor after the discussion.

Online Multiple-Choice Tests

There are 2 online multiple-choice tests on the LMS and, for each test, you are expected to complete 15 questions within 30 minutes. The first online test covered material up to week 3 while the second one covered material up to week 9.

Assignments

You can work individually or in groups of up to three for the assignments. The assignment questions are usually answered in the form of short essays and you might have to type in simple formulae. The first assignment covered the topics on measuring GDP, the labour market and the Keynesian model, whereas the second assignment covered the financial markets, monetary policy and the Solow-Swan model. According to my tutor, students generally perform better while

working in groups as you get the chance to compare your answers with your teammates and improve your understanding of the topics!

End-of-semester exam

Three past exam papers and solutions were posted onto the LMS to help us prepare for the 2-hour final exam. It is important to work through questions related to macroeconomic models by determining firstly, what factors are being changed and affected, and secondly, how the respective curves would shift in a logical manner. The steps regarding how the curves' positions change under specific scenarios are usually depicted clearly during the lectures. As a result, it will be helpful to go back to your annotated lecture slides to understand the logic behind these changes again if you don't know how to solve the questions.

I felt that the end-of-semester exam for this semester was of similar difficulty compared to the previous semesters. The multiple-choice questions were challenging as many questions were related to the theory side of GDP, which I slightly overlooked while doing my revision. Other than that, the extended response questions were fairly straight-forward and easy to tackle. Once you are familiar with the macroeconomic models used in the subject like the Keynesian and Solow-Swan models, you would soon find yourself being accustomed to the methods and steps used while answering the questions!

Concluding Remarks

All in all, I think it is absolutely possible to excel in Introductory Macroeconomics. By understanding how the models will be affected under different scenarios, you will most likely find this subject doable without any prior knowledge. Good luck!

ECON10004 Introductory Microeconomics [SM1]

Exemption status	CB2 *Business Economics*, in conjunction with ECON20001 *Intermediate Macroeconomics*. An average of 73 across this subject and ECON20001 *Intermediate Macroeconomics* is needed, with no fails.
Lecturer(s)	Professor Tom Wilkening Professor Phillip McCalman
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour tutorial
Assessments	Tutorial attendance and participation 10% 45-minute online multiple-choice test in Week 4 5% Written Assignment 1 due in Week 7 10% Written Assignment 2 due in Week 10 15% 2-hour end-of-semester exam 60%
Textbook recommendation	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. In Tom's lectures, certain diagrams were retrieved from the first textbook mentioned above. Referring to the textbook could be helpful in clarifying certain concepts from the lectures.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2019 Semester 1

Subject content

- Week 1: Introduction to Economics and its key concepts
- Weeks 2–3: Perfectly Competitive Markets
- Weeks 4–5: Welfare and Market Failures
- Weeks 6–7: The Firm and Managerial Economics
- Weeks 8–9: Imperfect Competition and Price Discrimination
- Weeks 10–11: Game Theory
- Week 12: Exam Review

ECON10004 Introductory Microeconomics is an engaging subject which introduces us to many key and fundamental economic concepts. Even though it was my first time learning economics, I found the content covered in the first five weeks fairly easy to understand since they mainly revolved around the supply and demand of a market.

However, starting from week 6, the concepts taught in the topics will become a lot more confusing as you start to see different variations of graphs that go beyond the simple supply and demand curves. It'll be a lot easier to grasp the mathematics involved to solve questions from the topics if you have a solid understanding of the concepts and the related graphs. My advice is to really understand the components of the graphs and how to sketch them out as graphs contribute

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

a fair amount of marks in the assignments and final exam.

Personally, I did not read the textbook since the lecture slides already contained most of the subject content. I only referred to it when I found the graphs on the lecture slides confusing. Even so, I did rely on the internet a lot when stuck on a concept. Do check out the Online Tutor regularly (something I wish I did), as chances are other students will struggle with the same concepts that you find confusing. So make full use of the Online Tutor!

Lectures

There are four lecture streams, two in the morning and two in the afternoon. Lecture slides were uploaded on the LMS over the weekends most of the time. It would be helpful to have a copy of the lecture slides with you. As I attended Tom's lectures, he always drew extra graphs and elaborated on the equations on a separate piece of paper (they were recorded and would appear on the Lecture Capture).

To be frank, Tom's lectures were pretty fast-paced at the beginning of the semester. If you find yourself falling behind, do rewatch his lectures on the Lecture Capture to fully understand the concepts. With that being said, you will soon find yourself accustomed to the pace as the semester goes on. A new system, TopHat was also introduced in this semester's lectures for interactive activities. Tom displayed the lecture slides from TopHat throughout the semester. All in all, Tom is a great and extremely knowledgeable lecturer who explains the concepts well.

Tutorials

Tutorial attendance and participation contribute 10% to your final mark in this subject. If you are unable to attend a tutorial, you can go for a replacement tutorial and ask the tutor to sign on a piece of paper. This way you will still be marked present by your actual tutor.

Every week an in-tutorial worksheet is given out and students are expected to work through the questions in class before the tutor starts giving out the solutions. The tutorial questions cover topics taught in the week before. It gives students a great opportunity to seek clarification on confusing concepts from their tutors.

There is also a pre-tutorial exercise every week on TopHat. Students can gain free access to the website as long as they are in the specific school zones. I recommend you to purchase the 1-semester plan as instructed by Tom as it will be a lot more convenient for you.

Assignments and Assessments

In the fourth week of the semester, a multiple-choice exam was conducted through the LMS subject webpage. Students were given 25 minutes to complete 8 questions. Some of the questions were tricky so do read through the questions and choices of answers carefully.

Assignment 1 mainly covered topics from the first four weeks of the semester and had a word limit of 750 words, whereas the second assignment covered topics from week 5 to week 9 and was allowed a maximum of 1250 words. Both assignments require a heavy use of diagrams to assist in answering the extended response questions. You could use any online graphing tools, like Desmos, to plot the graphs. I also used Microsoft Powerpoint to edit and label them afterwards. You will also be asked to show your full workings for some questions. Typing your workings out as equations on the word document can substantially reduce the word count as well. As I worked through both assignments, I gained a better understanding of the concepts taught in the topics as I had to apply them to solve the questions. They can serve as good revision for the final exam.

End-of-Semester Exam

The final exam lasts two hours and includes a mixture of multiple-choice, short answer and extended response type questions. It was out of 120 marks with a hurdle of 50% to pass the subject. Time constraint was the main issue and a piece of advice from a tutor was to answer the multiple-choice questions last so that you could spend more time on the questions which required longer answers.

Four past papers were released on the LMS subject webpage along with their answer keys so plenty of revision materials were available to help us prepare ourselves for the final exam. Again, make full use of the Online Tutor as they are there to help.

Concluding Remarks

It is important to fully understand the concepts first as the mathematical and calculation sides of the subject will almost come naturally once you understand the intuition behind the concepts. Lastly, remember to make full use of the resources available (pit stops, Online Tutor) throughout the semester (don't wait until the last minute)!

FNCE10002 Principles of Finance [SM1]

Exemption status	CB1 *Business Finance*, in conjunction with ACCT10002 *Introductory Financial Accounting*. An average of 73 across this subject and ACCT10002 *Introductory Financial Accounting* is needed, with no fails.
Lecturer(s)	Associate Professor Asjeet S. Lamba
Weekly contact hours	1 × 2-hour lectures 1 × 1-hour tutorial
Assessments	Tutorial participation 10% Online Assignment due in Week 5 10% 1-hour mid-semester test in Week 6 20% 2-hour end-of-semester exam 60%
Textbook recommendation	Graham, J. R., Smart, S.B., Adam, C. & Gunasingham, B. (2017), *Introduction to Corporate Finance*, (2nd ed.), AsiaPacific Edition, Cengage Learning. Textbook readings are assigned to students before each week's lecture. Although not absolutely necessary for success, the textbook provides a solid conceptual foundation before each lecture and acts as another point of contact when the lecture notes don't quite hit the mark. ✓ I would recommend buying this textbook.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2019 Semester 1

Comments

FNCE10002 Principles of Finance is one of four compulsory subjects for the Bachelor of Commerce and additionally provides exemption for CB1 *Business Finance*. Principles of Finance introduces students to the key concepts of finance, new to most high-school students. Topics range from calculating compound interest and valuing bonds to the capital asset pricing model and leverage.

Performing well comes down to having good mathematical skills in addition to strong conceptual understandings of the underlying financial models and theories. The nature of the subject shifts dramatically after the mid-semester break, transitioning from mostly formula work to analysing complex financial models and theories. For the end-of-semester exam in particular, having a deep knowledge of the intricacies involved in various financial theories is pivotal in scoring highly.

Subject content

- Week 1: Introduction to Principles of Finance and Financial Mathematics I
- Week 2: Introduction to Financial Mathematics II
- Week 3: Valuation of Debt Securities
- Week 4: Valuation of Equity Securities
- Week 5: Modern Portfolio Theory and Asset Pricing I
- Week 6: Mid-semester test
- Week 7: Modern Portfolio Theory and Asset Pricing II

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

- Week 8: Capital Budgeting I
- Week 9: Capital Budgeting II
- Week 10: Capital Structure and Payout Policy I
- Week 11: Capital Structure and Payout Policy II
- Week 12: An Introduction to Options

The first few weeks of content, up to Week 5, are very straightforward. Topics covered in weeks 1-4 consisted primarily of substituting values into various formulas and the only difficulty (if you can even call it that) is figuring out which formula to use. There is little theory involved in these weeks of content and when there is, it is often intuitive and not very complicated. However, this quickly changes after the mid-semester break as Asjeet unloads a number of financial models with deep theoretical underpinnings. Problems move towards questioning about assumptions and the specifics around the financial models and theories.

Lectures

There were four lecture streams, each being two hours long. For the most part, Asjeet's lectures were informative and comprehensive. At the start of every lecture, he would remind students of the assigned readings for the week but personally I felt that the lecture notes combined with his explanations were sufficient. Lecture notes were reasonably detailed, but it was expected that you added to these notes yourself. In particular, Asjeet would have questions in red text on the slides which he would answer during the lectures. I found that the answers to these questions very valuable in providing additional insight to the topic at hand, so it was always worth noting these down. Every single lecture was recorded and uploaded onto Lecture Capture in timely fashion. For PoF, I actually preferred watching lectures online to attending them in person, since they were identical in almost every way, but Lecture Capture had the advantage of being able to move at your own pace. This was ideal when topics became increasingly complex and you needed to additional time to think through and understand each slide before moving forward.

Tutorials

Every week, there is a 1-hour tutorial reviewing content from the previous week's lecture content. In preparation for each week's tutorial class, students are required to complete the first section (Part A) of the week's tutorial sheet. Note that this is graded as either satisfactory or unsatisfactory, and that only a genuine attempt is sufficient for marks. Even if you cannot do the problem, attempt it anyways, as it is not really homework but rather a way for the tutor to check that you have prepared for the tutorial. The remaining part of the tutorial sheet is gone through during the tutorial and students are encouraged to discuss and attempt the problems before the tutor provides solutions. While these are not necessary to have been completed prior to the tutorial, it was useful to at least read through the problems and have a think about them before the tutor went through them during the class.

Online Assignment and Mid-Semester Test

Both the online assignment and mid-semester test covered similar content (week 1 to week 4), but the online assignment was substantially easily and was worth less as a result. The assignment consisted of 14 multiple choice questions, worth 10%, and was online. The questions were handed out a week earlier and answers would be entered on the LMS once you had worked out the problems. In solving the problems, lecture notes should be referred to whenever necessary as this assignment is a great opportunity to score highly and improve your grade.

The mid-semester test, on the other hand, was held in week 6 and was worth 20%. Other than that, the format of the mid-semester did not differ vastly from the online assignment, besides the fact that it was to be completed in exam conditions in under an hour. Questions were also slightly more difficult. The time limit was generous to say the least, with many students

finishing well before the one-hour mark. It is therefore ideal to take your time and read through each question carefully, paying attention to the wording in particular. Two practice mid-semester exams were provided for preparation and study purposes. Another good source of revision would be to look over the formula sheet and to familiarise yourself with the relevant formulae.

End of Semester Exam

The end-of-semester exam was 2-hours and worth 100 marks as it was in previous years. The exam was split into a multiple-choice section worth 40 marks, and a short answer section worth the remaining 60 marks. As usual, some questions from the multiple-choice section had subtle word choices which made them confusing and difficult to answer. The exam consistently focused on the content covered after the mid-semester exam and as a result it was a lot more theoretical in terms of question style. That said, there were nonetheless formula-based problems in the latter section of the exam which favour the mathematically inclined. The main take-away from the exam is to concentrate study on fully understanding the concepts and assumptions which underpin the various models and theories covered in lectures.

Concluding Remarks

Overall, I found Principles of Finance to be an interesting and enjoyable subject. It teaches the basic workings of financial markets and provides a holistic overview of finance as an area of study. Do not be intimidated by the fail rates (which Asjeet will promptly inform you of in the very first lecture) as it is a very manageable subject if you consistently put in a few hours of study per week.

MAST10006 Calculus 2 [SM1]

Exemption status	Not an exemption subject; however, you will need either • a total of at least 150 across this subject and MAST10007 *Linear Algebra*, or • a total of at least 135 across this subject and MAST10008 *Accelerated Mathematics 1* in order to meet the prerequisites for ACTL20001 *Financial Mathematics I* (CT1 *Financial Mathematics* subject).
Lecturer(s)	Dr Chenyan Wu Dr Binzhou Xia Associate Professor Diarmuid Crowley Professor Christian Haesemeyer
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	✓ Make sure to get the green lecture book and exercise book on your first day of class from the Co-Op store.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2019 Semester 1

The material explored in Calculus 2 is often relatively simple to understand if you follow through consistently and complete the relevant questions/tutorial work, however the wide array and pace with which lecturers move can be a bit difficult to deal with at times. The most important factor in succeeding in this subject is to keep up with the content. It is understandable if you have to sacrifice completing all of the questions at certain times during the semester, however ensure you at least have some understanding of the previous notes when attending lectures otherwise it will be hard to keep track.

Subject content

- 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

Other Comments

As hinted at above, I highly recommend purchasing the printed notes from the co-op book store; these are essential as the lecturers work off these directly. Through the 3 lectures each week, they cover a lot of content and having these notes handy and collated in one place allows you to keep track of all the topics and quickly identify anything you may have missed. Additionally, each lecture begins with a review and having blank sides in the booklet gives you a perfect place to record

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these.

It is imperative to find a process that works for you. I started off by attending lectures, writing a few notes here and there on a notepad and then going home and re-watching it before filling it in on the booklet. I soon reverted to completing the notes during lectures as I felt - whilst the first method might have helped me grasp content better - it was extremely time consuming and meant I could not devote as much time on questions which I felt were integral to a greater extent to truly grasp the content. The provided question booklet is a great resource and I would highly recommend printing it out and working through it in a consistent manner, as there are a lot of questions similar to those you might encounter in exams. Work through these constantly and definitely review the tougher ones come SWOTVAC.

Tutorials

The tutorials involved the formation of little groups who worked off a provided tutorial sheet. I found that I enjoyed being in similar groups each week as we soon learnt each other's strengths and fall into a bit of a routine. For example, our group went through each question together, one person writing on the white board at a time whilst the others observed. I preferred this to working through the questions individually and then trying to compare with other group members as everyone works at a different pace and it leads to a lot of cramped whiteboards. It is a good idea to hold onto these sheets and review them before the final exam as they cover a lot of exam style questions.

Assignments

The weekly assignments came in two forms, namely written assignments and webwork.

The weekly assignments were generally quite straight forward. They do try to pick up on tiny details to stump students, but a week is more than enough time to go through it thoroughly. Talking to my tutor, he said most people's assignment marks generally increase over time as the first few weeks regarding limits and continuity rely more so on 'mathematical intuition' as opposed to working through problems sequentially, something that is often very different to high school mathematics. That said, it is not hard to do well on every assignment, doing so may just might require some deep thought or discussion with others. As with all maths questions, ensure to be careful with little details such as justifications, domains and presentation to prevent giving tutors an excuse to take any marks off.

With webwork, be cautious about the mark allocation. There were a couple of times where people would be tripped up by one part of a question, and this would cost them the whole question as opposed to just a single mark. You do get 3 attempts per question, so definitely use all of these and if you get something wrong, try not to rush into submitting something else you think could be right (particularly with multiple choice questions where you can select more than one option) as before you know it, you will have exhausted all your attempts.

Final Exam

Students do get access to quite a few practice papers. I felt the 2019 Semester 1 exam was relatively more difficult than the ones before as there was more focus on the finer details of first order differential equations, something barely explored in previous exams. Overall though, there are questions on every topic and you can generally predict the main techniques they will test you on. Ensure to know how to use the formula booklet to avoid unnecessary memorisation. You will however have to memorise certain concepts such as the conditions for various convergence/divergence tests, as these aren't provided and are essential for coming to a valid conclusion. Fortunately there aren't too many of these and some of them make intuitive sense.

Finally, it is important to remember that there are multiple lecture streams which you may attend, so if one topic doesn't sink in with one lecturer, then you are encouraged to try another. I used this technique for some of the more abstract concepts

such as the Comparison test.

MAST10006 Calculus 2 [SM2]

Exemption status	Not an exemption subject; however, you will need either • a total of at least 150 across this subject and MAST10007 *Linear Algebra*, or • a total of at least 135 across this subject and MAST10008 *Accelerated Mathematics 1* in order to meet the prerequisites for ACTL20001 *Financial Mathematics I* (CT1 *Financial Mathematics* subject).
Lecturer(s)	Dr Anthony Morphett Dr Alysson Costa Dr David Gepner Prof Arun Ram
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	✓ Make sure to get the green lecture book and exercise book on your first day of class from the Co-Op store.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2019 Semester 2

Comments

Calculus 2 explored many topics similar to Specialist Mathematics in high school, with a few additional topics being introduced. Since it is more of an extension from Specialist, if you have performed relatively well in it, you would find Calculus 2 to be fairly easy to pick up. Otherwise, you would have to put in more effort and consistently revise on the subject so that you don't lag behind. I personally prefer this subject over *Linear Algebra* as it is more closely related to what we have been learning in high school.

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.

Lectures

The lecture stream that I attended for the semester was taught by Prof. Arun. He has a habit of writing down the solutions on the whiteboard instead of the papers that were being recorded on the doc-cam. As a result, it was hard for the people sitting at the back to catch up and copy down the solutions during the lectures. Not writing the solution down on the papers also meant it was almost useless watching his lecture recordings. I ended up having to re-watch the recordings from Dr. Anthony even when I was still attending Prof. Arun's lectures. Though the lecturers conduct their lectures at slightly different speeds, I definitely feel that you would be able to do well and understand the subject content by watching Dr. Anthony's lecture recordings as he writes down the solutions on the tablet.

The lecture slides are given in the green lecture book which you are expected to buy at the beginning of the semester. If you prefer taking notes digitally on your tablets, you can also download the digital version of the lecture slides from the LMS.

Tutorials

Since no marks are awarded for tutorial participation in Calculus 2, it is totally fine even if you do not show up to your tutorials. However, it is highly recommended to attend them as you get to practise solving the questions with the assistance of your tutor and classmates. By exchanging your understanding with your classmates while approaching tutorial questions, you will be able to reinforce your knowledge. You can also easily go for a make-up tutorial if you missed your original one as well.

Tutorials commence on week 1 and start off with a revision on the topics you are expected to be familiar with from Specialist Mathematics or MAST10005 *Calculus 1*. Tutorials in the subsequent weeks then cover the contents taught in the previous week's lectures, so it is extremely important to catch up on each week's lectures before attending your tutorial.

Assignments

There are 9 weekly individual assignments in total, with 6 written and 3 online ones, with each contributing 2.22% to your final grade. They are released each Monday starting from week 3 and due on the following Monday. The questions on the assignments were sometimes more difficult than the ones shown in lectures and tutorials. I performed badly in the first two written assignments as I was not aware of how strict my tutor was with the notations used in the solutions. You will also get penalised heavily if you do not include the specific theorem or rules used when answering questions from the first topic.

A good tip is to always check your marked assignments against the solutions that would be posted on the LMS as sometimes your tutor might mark you wrongly due to you answering the question with a different approach. There was a time when I felt that my answer was correct, even though the method I used was slightly different from the solutions given. I emailed the subject coordinator and explained that I was just following my lecturer's method. The subject coordinator then awarded marks accordingly and updated my grade for that assignment.

End-of-semester exam

We were provided with four past exam papers and solutions to prepare for the 3-hour final exam. I recommend starting your revision and attempting the past exam papers early so that you can fully utilise the consultation hours during SWOTVAC and the exam period. A formula sheet is provided during the exam so try to familiarise yourself by using it while doing revision.

The end-of-semester exam is a 3-hour long paper that consists of topics that are covered throughout the entire semester. The exam for this semester was definitely easier than the paper from Semester 1 in 2019 but was of similar difficulty compared to other past exam papers. Questions that I found challenging during the exam were the ones related to convergence and divergence of the series, while questions from the latter topics were relatively easy and straightforward.

Concluding Remarks

Overall, it is definitely not impossible to score well for this subject! Just keep in mind to work consistently hard throughout the entire semester and you will most likely be fine. All the best!

MAST10007 Linear Algebra [SM1]

Exemption status	Not an exemption subject; however, you will need either • a total of at least 150 across this subject and MAST10006 *Calculus 2*, or • a total of at least 135 across this subject and MAST10009 *Accelerated Mathematics 2* in order to meet the prerequisites for ACTL20001 *Financial Mathematics I* (CT1 *Financial Mathematics* subject).
Lecturer(s)	Dr Christine Mangelsdorf Dr Anthony Morphett
Weekly contact hours	3 × 1-hour lectures 1 × 1-hour tutorial 1 × 1-hour computer lab session
Assessments	10 × individual weekly assignments 10% 45-minute written computer laboratory test in week 12 10% 3-hour end-of-semester exam 80%
Textbook recommendation	Fitzherbert, R., & Pitt, D. (2012). *Compound Interest and its applications*. Melbourne, AU: University of Melbourne Custom Book Centre. Anton, H., & Rorres, C. (2013). *Elementary Linear Algebra*, (11th ed.), Applications Version, Wiley. Textbook was not referenced throughout the entire semester. The lecture notes available on the LMS are sufficient, so ✗ it is not recommended.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2019 Semester 1

Subject content

The first few weeks of Linear Algebra pretty much cover the basic "building blocks" of the subject. If you took Specialist Mathematics in high school, these concepts would be familiar to you. However, do not let your guard down as once the vector space topic is introduced, you will notice a lot of brand new topics and content that require rigorous thinking and the ability to find the connections between the topics. Generally, lectures and tutorials were paced nicely and Christine's lectures were easy to follow.

1. Linear equations

   In this topic, you'll be introduced to systems of linear equations, matrices and how to solve the system by performing row operations on the matrix. As you'll be required to apply this technique to most of the future topics in this subject, you'll want to know it like the back of your hand (you can practise by answering questions from the homework problem sheets in the course guide). Be sure to double or triple check your matrices in row or reduced row echelon forms as careless mistakes can easily be made as we're not allowed to use calculators.

2. Matrices and determinants

   This topic covers the general properties of matrices and how to find matrix inverses. In addition to that, you'll learn how to perform row operations to find the rank and determinant of matrices. You'll also be taught to use cofactor

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expansion to calculate the determinant.

3. Euclidean vector spaces

   This topic introduces students to vector geometry, lines and planes along with dot and cross products. Students will be taught how to calculate area and volume using cross product, form vector equations of a line and a plane and how to convert between parametric and Cartesian forms.

4. General vector spaces

   In this topic, you'll be introduced to new terminology and concepts related to vectors such as spaces, spans, bases and so on. Knowing the axioms that determine spaces and subspaces is crucial as it would assist you in answering questions that will be tested from this topic. I personally found 3Blue1Brown's (a YouTube channel) Linear Algebra series very helpful when it comes to understanding the intuition behind the concepts taught in this topic.

5. Linear transformations

   This topic involves transforming vectors and vector spaces by mapping one space to the other. You'll be required to prove if the mappings are linear transformations. Besides that, the idea of nullity, image and kernel of a transformation matrix will be introduced. A solid grasp on the concepts from topic 4 will help you understand the concepts in this topic tremendously.

6. Eigenvalues and eigenvectors

   This topic covers the basic properties of eigenvalues, eigenvectors and how to find them by calculating determinants and performing row operations again. Although the lecture slides do not really explain what they are used for, 3Blue1Brown's video on this topic helps with the visualisation and covers the intuition pretty well.

7. Inner product spaces

   This topic generalises key properties of the dot product (introduced in Topic 3) to allow it to be performed on general vector spaces (introduced in Topic 4), where different rules according to the vector space are applied on the inner product between vectors. Students will also be taught to use inner product in the Gram-Schmidt procedure.

Lectures

Since the lecture notes were rewritten, blank lecture slides were released throughout the semester on the Linear Algebra LMS subject webpage. Students are expected to print them out and bring to the lectures.

There are two lecturers teaching this subject, each taking charge of one lecture stream. I attended Christine's lectures at the beginning of the semester. Christine always shows clear steps required to solve the examples and she stresses a lot on the importance of getting the notation right when answering questions in this subject.

Lectures from both lecture streams are recorded and will be available after the lectures on Lecture Capture. I personally relied on the lecture captures instead of physically attending them towards the latter half of the semester and still found the subject manageable. However, the catch is to consistently review the lecture captures every week and not fall behind. Once it piles up, you will find it hard to catch up with the content since there are three lectures per week.

Tutorials

In every week's tutorial, a worksheet will be handed out to the students and you'll be required to work in groups and solve the questions on the whiteboard. The solution sheet is then given out, only to those who have attended, at the end of the

tutorial. Although marks are not given for tutorial participation and attendance, attending tutorials is one of the most helpful ways in solidifying and strengthening understanding of the concepts taught from the previous week.

In addition, there will be a computer lab session right after the tutorial. Students then work through exercises from the computer lab booklet on MATLAB. These exercises are meant to help students visualise the application of certain topics in linear algebra. Personally, I found it enjoyable but frustrating at times when I could not answer certain questions (no answers are given for MATLAB exercises and sometimes not even the tutor knows the solution).

Assignments

There are 3 online and 6 written assignments in total. Online assignments are conducted through WebWork (a website), whereas written assignments are to be handwritten and placed into the appropriate assignment box in the Peter Hall building.

Questions asked are generally straightforward and closely resemble the examples from the lecture notes. You can refer to your notes as you answer the questions but try not to rely too much on them. (Answering based on your understanding first before double-checking with reference to the notes can serve as a great revision tool.) As mentioned before, Christine is very particular when it comes to getting the notation right. So do double check before submitting your written assignments as you may get penalised heavily for getting it wrong.

MATLAB

A sample test will be released on the LMS approximately one week before the test. Do attempt the test as many times as you can as the actual MATLAB test would be very similar to the samples. As long as you work through all computer lab exercises and understand how to apply the specific MATLAB commands to solve questions, the actual test should be fairly easy to score highly in.

End-of-Semester Exam

The 3-hour time limit is sufficient to complete the paper and double/triple check your workings. It's important to check through all the row operations and calculations a few times to avoid careless mistakes. If you are stuck on a question, leave some space, skip it first and come back later. A good tip that my tutor shared is to list down the properties and axioms that you think are related to the question you are stuck on. This can provide clues to help you work through the question.

Generally, the format of the final exam is very similar to the past years' papers that were released on the LMS. Almost all topics and subtopics were covered and questions were arranged in the sequence of the topics being taught. For revision, attempt the past years' papers and the homework from the course guide to familiarise yourself with the style of questions being asked, and be sure to go through all the subtopics during your revision.

Concluding Remarks

Linear Algebra is an enjoyable subject which exposes you to the more abstract side of mathematics. Take some time to visualise and understand the intuition behind the concepts and you will start to notice the wonderful links between the topics (they are all interconnected!). Consistently attempt the homework questions from the course guide instead of piling them all up and only starting when it's close to SWOTVAC as there simply won't be sufficient time for you to attempt all of them.

MAST10008 Accelerated Mathematics 1

Exemption status	None. However, you will need either: • a total of at least 120 across this subject and MAST10009 *Accelerated Mathematics 2*, or • a total of at least 135 across this subject and MAST10006 *Calculus 2* in order to meet the prerequisites for ACTL20001 *Financial Mathematics I* (CT1 *Financial Mathematics* subject).
Lecturer(s)	Dr Alexandru Ghitza
Weekly contact hours	4 × 1-hour lectures 1 × 1-hour tutorial 1 × 1-hour MATLAB tutorial
Assessments	3 individual online tests in weeks 3, 4, & 10 — 3 × 2% 3 individual assignments due in weeks 5, 7 & 11 — 3 × 3% 1-hour MATLAB test in week 11 — 5% 3-hour end-of-semester exam — 80%
Textbook recommendation	Anton, H., & Rorres, C. (2010). *Elementary Linear Algebra: Applications Version* (10th ed.). New York, US: John Wiley & Sons. Textbook was not once referred to throughout the semester and it was very uncommon to see students actively using it. The provided lecture notes are more than sufficient to perform well in this subject. ✗ I do not recommend this textbook.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2019 Semester 1

Comments

MAST10008 Accelerated Mathematics 1 (AM1), combined with MAST10009 *Accelerated Mathematics 2*, is designed to cover prerequisites for three mathematics subjects: MAST10005 *Linear Algebra*, MAST10006 *Calculus 2* and MAST20026 *Real Analysis*. Accelerated Mathematics 1 introduces students to topics and methods in linear algebra, an area of mathematics new for many recent high-school graduates. Towards the end of the semester, the subject also covers differentiation and integration of multivariable functions in preparation for *Accelerated Mathematics 2*.

Performing well in this subject comes down to having a thorough and refined understanding of each topic and the interrelationship between these topics. Theorems and formulae are thrown around left, right and centre, so it is critical that you are comfortable with their application in solving exam and assignment problems. Personally, I felt that having an intuitive view of concepts in linear algebra was almost as important as understanding the rigorous mathematics involved in proofs and derivations. As previously recommended, the YouTube series 'Essence of Linear Algebra' by 3Blue1Brown is fantastic at helping you visualise the content in this course, which then further builds mathematical intuition.

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

Subject content

- **Topic 1 - Matrices and linear equations:** This topic introduces students to matrix arithmetic and properties of matrices. Key concepts include row echelon form and determinants, ideas of which should be understood in great detail come exam time. When doing practice problems around elementary row operations, take the time to carefully perform the calculations (as tedious as it is) since you will be punished quite harshly in exams for arithmetic errors. Vectors and solid geometry are also covered in the topic and should be fairly accessible to most students. Main skills include converting between parametric and Cartesian forms of a line, in addition to making use of the various formulae for orthogonality and distance.
- **Topic 2 - Introduction to rigorous mathematics:** This topic takes a break from matrices and vector geometry, and instead explores the theoretical underpinnings of mathematics. It covers various methods of proof as well as sets and functions. Proof by induction is perhaps the most important concept from this topic, so ensure that you are competent in solving an extensive range of induction questions.
- **Topic 3 - Vector spaces and linear transformations:** This topic contains the bulk of linear algebra covered in this course and is consequently questioned extensively on exams. Vector spaces can seem initially abstract and almost nonsensical but be assured that many others are thinking exactly the same and it is only a matter of time before everything clicks. Linear transformations can also be confusing especially with the notion of different bases. Again, visualisations from YouTube animations are invaluable in facilitating your understanding. Commonly asked questions on this topic include proving whether a certain set is a vector space or not, so it is vital that you know the subspace theorem and are comfortable with it. Similarly, questions about whether a transformation is linear or not also come up frequently, so again ensure you know what the conditions for linearity are.
- **Topic 4 - Inner products:** This topic introduces inner products, taught as generalisations of the dot product similar to how vector spaces are generalisations of the Euclidean plane. Inner products are not particularly difficult, as all the formulas used in topic 1 reappear albeit slightly differently. Eigenvalues and eigenvectors are covered in this topic as well. Typical exam questions ask about calculating eigenvalues and diagonalization, which become routine with some practice.
- **Topic 5 - Introduction to multivariable calculus:** This topic marks the end of linear algebra and covers surfaces in three-dimensional space, partial derivatives and optimisation in addition to complex numbers. Multivariable calculus follows intuitively from calculus in one variable, so students should find this topic manageable. There are a number of conditions and formulae which do need to be memorised, however. Complex number questions are fairly limited to examples covered in lectures and in the problem booklet, so these should be easy marks if you are familiarised with them.

Lectures

Lectures in this course are informative and insightful, although they progress quickly and rather dense in content. There are lectures on all days of the week other than Wednesday, so falling behind is especially undesirable. I found that it was extremely helpful to quickly review all concepts covered after every lecture to strengthen my understanding, since each lecture built upon the content from the previous one. All lectures are recorded onto Lecture Capture and are equally as informative online as they are in person. Note that Alex sometimes uses two DocCams when working through lecture notes, but only one camera is recorded onto Lecture Capture. For the most part, he did a fantastic job of ensuring that everything was recorded by the primary camera but there were rare occasions where he would forget to move his working over, and you would be left staring at a blank page for a few minutes. Of course, this was very uncommon and won't be a problem if you intend on attending all the lectures anyway. Overall, he was a great lecturer, very intelligent and explained all concepts comprehensively in an easy to understand manner. His witty sense of humour provides some much-needed comedic relief throughout the semester.

Tutorials

Tutorials are a great chance to apply concepts learnt in lectures to exam-style questions. Tutorials typically consisted of small groups of students attempting problems from a question sheet, while the tutor would roam the class providing assistance. It was a good opportunity to also ask any burning questions you had or to clarify any misconceptions. At the end of the tutorial, detailed answers to the question sheet were handed out.

Laboratory classes are almost identical in nature to tutorial classes, where each student would work through a MATLAB handout on their individual computers. In all honesty, these classes were pretty useless and only helps with the end of semester MATLAB test. That said, if you are interested in the many applications of linear algebra, you may find these classes enjoyable and worthwhile.

Written and Online Assessments

The written assignments in this course are tedious to say the least. They are often time-consuming and require a high degree of justification disproportionate to the number of marks awarded. The questions are nearly always more difficult than final exam questions and are designed as such to provoke deeper and more nuanced mathematical thinking.

The online assignments, on the other hand, were far more accessible and considerably shorter. Questions were also very generic and test basic knowledge and understanding. Students should be able to score full marks on these assignments.

MATLAB Test

The MATLAB test is out of 25 marks and acts almost as a check-up as to whether you know your stuff before the final exam. The content in the test is very similar to that of the final exam, just with 'ugly' numbers so that you are forced to use MATLAB. Personally, I found that the laboratory classes (other than the very first one) did not prepare you very much for the test, and that revising lecture notes and tutorial sheets was far more effective. The MATLAB commands necessary are printed on the cover sheet so it comes down to a matter of knowing what each of them do, most of which are fairly self-explanatory. There is also a 5-mark programming question at the end which can prove challenging if you have no prior background in computing.

End of Semester Exam

The final exam was out of 95 marks instead of the typical 100 seen in previous years. Each major topic and sub-topic made an appearance on the final, with most of the exam focusing on Topics 3 and 4 as expected. The three-hour time limit is fair given that you are working at a reasonable pace. Sub-questions are often unrelated to each and are additionally worth little marks, usually 2-3, so do not feel afraid to skip ahead if you are stuck on one. The worst thing to do is to linger on a 2-mark question for 10 minutes when there is an easy 8 marker a few questions ahead. As always with this subject, take extreme caution with arithmetic calculations. In regard to revision, past exams provide good indication of the difficulty and style of questions.

Concluding Remarks

Out of all the typical first-year first-semester subjects, AM1 will definitely be the most difficult, even if you are mathematically skilled. The fast pace and relatively long contact hours combined with tricky questions will ensure that you devote most of your attention onto this subject come exam time. Regularly do practice questions from tutorials and problem booklet, clarify misunderstandings and review lecture notes frequently in order to perform as well as possible in a challenging but intellectually rewarding course.

MAST10009 Accelerated Mathematics 2

Exemption status	Not an exemption subject; however, you will need either • a total of at least 120 across this subject and MAST10008 *Accelerated Mathematics 1*, or • a total of at least 135 across this subject and MAST10007 *Linear Algebra* in order to meet the prerequisites for ACTL20001 *Financial Mathematics I* (CT1 *Financial Mathematics* subject).
Lecturer(s)	Prof Barry Hughes
Weekly contact hours	4 × 1-hour lectures 1 × 1-hour tutorial
Assessments	2 individual assignments due in Weeks 5 and 10 2 × 5% = 10% Mid-semester test in Week 6 10% 3-hour end-of-semester exam 80%
Textbook recommendation	MAST10009 Accelerated Mathematics 2 Textbook This is the designated textbook for the subject, available from the Co-op Book Shop and written by Barry himself. ✓ The textbook is absolutely essential and there is almost no way you can pass without it. The lectures and tutorials follow directly from the textbook, so ✓ purchasing is a must.
Lecture capture	Partial. Document camera is available (both audio and video), but the content written on whiteboards is not shown
Year and semester reviewed	2019 Semester 2

Comments

MAST10008 Accelerated Mathematics 2, combined with MAST10009 *Accelerated Mathematics 1*, is designed to cover prerequisites for three mathematics subjects: MAST10005 *Linear Algebra*, MAST10006 *Calculus 2* and MAST20026 *Real Analysis*. MAST10008 Accelerated Mathematics 2 aims to redefine students' understanding of calculus and analysis, challenging high school ideas of functions, derivatives and integrals. At the same time, students are exposed to unfamiliar concepts including indefinite integrals and infinite series. Mathematical rigour and precision underpin this subject as Barry builds up real analysis and calculus from its foundations.

This subject is challenging and demands consistent effort throughout the semester to score well. At a bare minimum, you should watch all lectures on the LMS and attend all tutorials, spending time after each lecture to review the content. To perform well, however, you must stay up to date with the lectures, best done by attending all of them in person if possible, and also trying practice problems after each lecture.

The level of rigour and precision expected by Barry and the tutors can be frustrating to deal with initially, but you will get used to it as the semester progresses. As a result, the assessment for this course is very conceptual in nature, as Barry often asks you to state a particular theorem or to prove a result covered in the lectures. Fundamentally, he is testing your understanding of the course content and whether you are able to apply these concepts to problems of significance or interest.

Subject content

Sequences

This topic refines and reintroduces high-school ideas of limits in a more mathematically formal manner. Barry continues on to introduce concepts of convergence, divergence, asymptotic behaviour and limits. In my opinion, this is one of the most important topics as it forms the foundations for topics to follow. It is vital that you take the time to fully grasp and understand ideas covered in this topic, as it not only helps to prepare for the mid-semester test but also strengthens your mathematical intuition. One specific area which is worth dedicating time to is the use of Landau symbols and asymptotic behaviour, as Barry does not dedicate much time to them. Regardless, familiarity with these concepts is immensely helpful in further topics of differential calculus and especially infinite series.

Functions, limits and continuity

This topic extends the idea of limits and sequences to real-valued functions and their behaviour. Continuity is the main focus of this topic, as Barry introduces and proves a number of important theorems for continuous functions. This topic is very similar in nature to the previous one, so concepts and ideas should follow through relatively easily. The number of definitions and theorems to memorise increase substantially so be prepared to do some rote learning. I found that having a clear idea of the proofs of the theorems made it much easier to memorise as it would become apparent why a particular interval or inequality is used.

Differential calculus

This topic primarily aims to build up high-school calculus from the ground up, establishing familiar results such as the product rule while introducing new theorems including L'Hopital's Rule and the Mean Value Theorem. Hyperbolic functions are also covered here. While there is still the fair share of definitions, theorems and proofs, I thought this topic was more manageable than the previous two topics due to some previous exposure in high school. Problems range from mechanical, calculation type derivations to applications of the Mean Value Theorem, which become routine with some practice.

Integral calculus

This topic develops integral theory using ideas of Riemann sums and Darboux integrals, before reviewing and introducing techniques for integration. The first two lectures are very conceptual in nature and various definitions from the first lecture especially appear often on past exams. The last and remaining two lectures of this topic focus on the more mechanical side of integration, applying techniques such as integration by parts and various substitutions. A few practice problems with each technique will be enough to get you up to speed.

Differential equations

This topic introduces numerous types of differential equations and techniques for solving such equations, as well as their applications in physics problems. It is intended to be equivalent to content covered in *Calculus 2* and as a result, most students should find this topic fairly doable. Solving the differential equations was very similar, in essence, to solving integrals; first, identify the type of equation or integral, then apply the appropriate technique. As for application questions, I recommend following Barry's advice when it comes to learning the differential equations; that is, to understand and reproduce the derivation rather than purely memorising each and every equation. An exception to this would be the solutions to second-order characteristic equations, which you are better off just memorising. Phase plots, I felt, were under-emphasised yet appeared often in exams, so make sure you are comfortable both drawing and interpreting them.

Improper integrals

This topic further extends the idea of an indefinite integral, examining cases where a function may be undefined or cases where a terminal is infinity. Conditions for both Riemann integrability and improper Riemann integrability are crucial for this topic and students must be familiar with them. Limits theorems in conjunction with various tests will be the main tools used in assessing improper Riemann integrability.

Infinite series

The final topic of the course covers infinite series, of both numbers and functions. Conceptually, this topic is probably the easiest to understand with a little bit of difficulty towards the end of the topic with power functions and radius of convergence. You were almost never asked to calculate the value of a sum, but rather to determine its convergence or divergence using a number of tests. Knowledge of and familiarity with Landau symbols and asymptotic behaviour was very useful in this topic. Again, Barry will ask you to quote some of these tests so ensure that you know the necessary conditions for each one.

Lectures

Like MAST10008 *Accelerated Mathematics 1*, there were four lectures every week and proceeded at a very fast pace. During each lecture, Barry would project content based off the textbook onto the screens, explaining each slide in detail. He would then solve examples from the textbook on the whiteboard, which is not recorded onto Lecture Capture. This meant that if you do not attend the lectures, you will not have the solutions to many of the examples unless you got them off a friend. For this reason, he recommends that you attend every single lecture. Personally, I found that if I had the notes from a friend, watching the lecture online was equally as effective as watching them in person. This would mean that you are behind slightly, but as long as you had covered the necessary content before each tutorial class, it would not be too much of an issue.

The lectures themselves were very informative. The content was well-presented and explained clearly by Barry. Despite this, it was almost always necessary to review content immediately after the lecture to fully grasp its complexities. An advantage of watching them online is that you can play and pause whenever you needed time to digest some information.

Tutorials

Tutorials consisted of small groups of students working on set problems from the textbook while a tutor roamed the room providing assistance. Attendance was not necessary, and, in all honesty, I found that the tutorials did not provide much additional benefit. You could just as easily complete the problems in your own time and go to a consultation if you run into issues. The tutor did not provide more insight than was covered in the lectures either. Regardless, I recommend attending them anyway since you have paid for them and it was a good chance to attempt the problems with an expert in close proximity.

Assignments

Barry's assignments are notoriously difficult to score highly on as he demands a high level of mathematical rigour and precision, in addition to the assignments being complicated in general. Both assignments are worth 50 marks and are due within two weeks, so it would be foolish to leave them until a few days before the deadline. As a general rule of thumb, anything that would make your answer more detailed should be included, within reason of course.

Mid-semester test

The mid-semester test was 40 marks, with a 45-minute time limit and worth 10% of the final grade. The questions were substantially easier than those in the assignments, but the 45-minute time constraint was challenging to work with. Similar to the assignments, a high degree of mathematical rigour is expected, and you will lose marks for not explicitly referencing a standard limit, for example. Theorems and definitions made up more than 25% of the test, so it is crucial to know them very precisely.

End-of-semester exam

The exam was out of 131 marks in 2019, compared to the typical 125 marks found in previous years. I found that the exam was slightly different in terms of content to previous 2017 and 2018 exams. There was a large emphasis on differential equations in both the 2017 and 2018 papers, but Barry shifted many marks away from differential equations and into AM2 specific content, such as Riemann sums and radius of convergence. For the most part, however, it was similar to many other past exams and there was nothing unexpected. Again, definitions and theorems make up a significant portion of the exam so come prepared.

Concluding Remarks

AM2 is most definitely a difficult subject, but it was also one of the most enjoyable for me. The content, while tricky, is very interesting and extremely rewarding when understood completely. Keeping up to date with content and regularly attempting practice problems will set you up well to both enjoy and excel in this course.

Second-Year Subjects

Contents

ACTL20001 Financial Mathematics I (1)

Exemption status	CT1 *Financial Mathematics*, in conjunction with ACTL20002 *Financial Mathematics II*. Satisfactory performance in both subjects' end-of-semester exams is needed.
Lecturer(s)	Dr Ping Chen
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour tutorial
Assessments	Group assignment, due in Week 7 — 10% 45-minute mid-semester test in Week 7 — 10% Group assignment, due in Week 12 — 10% 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 recommend buying Compound Interest and its applications. See 'Necessary Resources' in the body of the review for more information.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2019 Semester 1

Subject content

- Weeks 1-3: Chapter 1 — Fundamental concepts
- Weeks 4-8: Chapter 2 — Valuing cash flow
- Weeks 9-10: Chapter 3 — Financial analysis of loan contracts and business projects
- Weeks 11-12: Chapter 4 — Background to institutional investments

Financial Mathematics I (FM1) consists of four chapters of content based on the first four chapters of the accompanying textbook. From a glance, FM1 shares much of the same content as ACTL10001 *Introduction to Actuarial Studies* reintroducing actuarial notation, valuing cash flows and loan contracts. However, this subject builds on prior concepts, expands on their applications and delves deeper into their definitions and proofs touching on methods of proof from MAST10009 *Accelerated Mathematics 2* helping to build intuition on why these concepts work and when to apply them. There is also new content introduced such as increasing and decreasing annuities and types of institutional investments.

Lectures

Due to the limited number of actuarial students, there is only one lecture stream for FM1. It may help to build your timetable about these lectures though they tend to be at accessible times (Wednesday and Thursday afternoon for Sem 1, 2019). Lecture slides were broken into individual chapters and released well in advance of the lectures, and were accompanied by supplementary notes released on the LMS when required.

Lectures consisted of Ping briefly reviewing concepts from the previous lecture before introducing a new concept with help from the lecture slides. Although the lecture slides give sufficient information to introduce a topic and what it means, some additional details and proofs will be provided by Ping via annotation. Concepts involving calculations are often

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accompanied by introductory examples which will be explained in the lecture slides, however, more nuanced applications of concepts such as those appearing in assessments and tutorial questions may require more time to digest.

Tutorials

Tutorials for FM1 begin on the first week of the semester, with tutors reviewing the pre-tutorial questions for each week released at the start of the semester. Tutorial attendance is not assessed and solutions to these questions are released every Friday. These factors combined lead to low tutorial turnout, which can result in a very personalised tutorial experience.

Tutorial questions for each week consisted of 3-7 questions of varying difficulty. Though some questions involved straightforward concepts from lectures in the previous week, other questions hinted at topics in future subjects or proving certain equalities. It was clear that these questions were not examinable.

Overall, I believe that tutorial attendance for the subject is not necessary. Completing the tutorial questions, then cross-checking them with the solutions should be sufficient to grasp the course material. That being said, tutorials provide a good opportunity to ask questions and solidify understanding of concepts.

Assignments

There were two group assignments for FM1 consisting of 3-5 people. Groups could be formed with anyone completing the subject regardless of tutorial time. Assignment questions were released about 3 weeks before they were due. Both assignments were out of 20 marks.

Unlike previous years, the assignments for FM1 this year were application based, requiring a combination of research and calculations to reach a conclusion. Due to this, it is not a good idea to leave the assignment to the last minute as the assumptions made when answering questions may need to be discussed as a group. Overall, both assignments were quite accessible, and many groups tended to score close to full marks.

Mid-Semester Exam

The mid-semester exam was in week 7 and was a 45-minute exam with 5 minutes of reading time. The exam covered content from Chapter 1 and half of Chapter 2. Like most actuarial exams, no formula sheet is provided so formulae must be memorised. Prior to the exam, two practice papers were released with the actual exam format following it closely.

The paper itself was of quite fair, all the questions were accessible so long as revision was done beforehand, with time pressure preventing most from achieving higher scores. It may be prudent to learn how to store equations or numbers as variables on the FX82 calculator to avoid having to retype equations, thus saving time. Solutions were released after the exam with papers available for review during the following tutorial.

End-of-Semester Exam

The final exam ran for 2 hours with 15 minutes of reading time making up 70% of the subject mark and is the only assessment contributing to the CM1 *Actuarial Mathematics I* exemption. The exam is out of 70 marks, making 1 mark equal to 1% of the subject. Like all FBE subjects, there is a 50% exam hurdle. It was mandatory to have a calculator (Casio FX-82 any suffix) and no formula sheet was provided. Two past exams with solutions were made available on the LMS (with more available on the Library website).

The structure of the exam was identical to the past papers released and the difficulty was definitely a step up. The exam itself consisted of 11 questions and is application based with many calculations (timelines will be your best friend) accompanied by 1-2 questions of proofs and theory (from Chapter 4). Formulae learnt throughout the semester will need to be internalised

with their applications understood, knowing the formulae alone will not be enough the solve some of the more complicated questions. For example, instead of constant loan repayments, increasing and decreasing annuities could be applied to loan amortisations instead.

Necessary Resources

The recommended textbook for FM1 is Compound Interest and its applications by Fitzherbert. R. & Pitt. D. The textbook is available for purchase at the University Co-op Bookshop for $33. While I recommend purchasing the textbook, it is mostly a denser version of the subject's lecture slides, with better explained definitions, proofs and other nuances. It also provides practice questions with worked solutions for each chapter that are useful for exam preparation. However, if you prefer learning through Ping's explanations, the textbook may not be necessary.

This textbook is also used for ACTL20002 *Financial Mathematics II*.

Concluding Remarks

Financial Mathematics I provides a comprehensive introduction to the basic tools used by actuaries. During the semester it's not too difficult as long as you keep up with the content. Much of the difficulty of this subject can be attributed to the exams, as, come exam time (mid-semester and final) a strong understanding of cash flows, discounting and the relationships between notation will be required. In my opinion, the best way to approach this subject will be to build and develop intuition through consistent practice so that applying concepts to different scenarios will become a reflex.

ACTL20001 Financial Mathematics I (2)

Exemption status	CT1 *Financial Mathematics*, in conjunction with ACTL20002 *Financial Mathematics II*. Satisfactory performance in both subjects' end-of-semester exams is needed.
Lecturer(s)	Dr Ping Chen
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour tutorial
Assessments	Group assignment, due in Week 7 10% 45-minute mid-semester test in Week 7 10% Group assignment, due in Week 12 10% 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. ✗ Not necessary unless you want to utilise the exercises. Lecture covers all the content needed.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2019 Semester 1

Subject content

- Week 1: Present Value and Interest/Discount rates
- Week 2: Nominal and Effective Interest/Discount rates
- Week 3: Force of Interest and Applications
- Week 4: Present Value with varying and constant rates
- Week 5: Valuing Cash Flows
- Week 6: Continuous Cash Flows and Applications
- Week 7: Payments with Linear Variations
- Week 8: Equation of Value
- Week 9: Loan Contracts and Repayment
- Week 10: Evaluation of Projects
- Week 11: Characteristics of Major Asset Types
- Week 12: Characteristics of Major Asset Types/ Revision

This will be your first, proper actuarial subject, where the completion is compulsory and counts towards your exemptions. Many find this as a repeated subject from ACTL10001 *Introduction to Actuarial Studies* from your first year, and whilst this may be true for the first few weeks of the course, you will soon learn that ACTL20001 goes much more in depth with regards to the financial mathematics. That being said, if life tables were not your forte, this may be your time to shine.

The subject starts off relatively easy, leading to some students slacking off and often results in unnecessary shocks when the content becomes more difficult. As there are many new actuarial notations introduced in this subject (and yes, that means more formulas), it is important not to underestimate the difficulty of the subject. Understanding of mathematical concepts such as Taylor series are assumed, hence if you have not taken MAST10009 *Accelerated Mathematics 2*, take

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some time to learn, or at least have a brief idea of these concepts.

Lectures

There are 2 lectures per week, both fully recorded with slides uploaded on the LMS prior to the lectures. When Ping writes anything outside of the slides, which she does occasionally, she will scan and upload this on the LMS as well, which I found handy for revision. The pace of the lecture is quite slow from what I have experienced, as I was able to follow through the lecture even on 2-times speed using lecture capture. There was a complaint made to Ping about this, and she explained that she must cater to all students, including those who have not completed ACTL10001 . While the slides are pretty much self-explanatory, I would still recommend going through the lectures to understand the different examples.

Tutorials

Unlike your other commerce subjects, ACTL20001 does not consider attendance and participation as part of your assessment criteria. Tutorial questions are provided on the LMS, and whilst the answers for these are uploaded at the end of every week, the explanation/working-out provided in these answer sheets tend to be very brief and sometimes even insufficient. I would strongly recommend you to go to these tutorials to hear the full explanation and be able to ask questions when you do not understand something. The format of most tutorials will see the tutor go through each question and explain the solutions.

Assessments and Assignments

The assignments, both 1 and 2 were very practical tasks, where students, in groups of five, were required to conduct their own research to find and utilise real life data, such as the cash rate or the stamp duty level. They both contributed 10% to your final mark. Being able to use Excel proficiently is a very handy advantage, as it is not possible to do the assignment purely with pen and paper. I strongly suggest that you first attempt these assignments individually, then gather as a group and check for differences. This way, you can ensure that you make the least amount of errors as a group. The mid-semester exams, like any other actuarial exam, was difficult mostly because of the short time frame. Familiarise yourself with the FX-82 calculator to avoid wasting time during the exam.

End-of-Semester Exam

A big tip for studying for the final exam is to go through the tutorial questions. Whilst the exercises from the textbook may help, I think the tutorial questions are much more relevant. Ping also tends to ask questions that students did not do so well in during the mid-semester exam, so make sure you read the mid-semester exam review. Memorising your formulae may seem daunting initially, but you will soon realise that there is a pattern to them. Again, the time constraint will be an issue, so familiarise yourself with the calculator and the sorts of questions asked. You will be able to do this using the past exams that the lecturer provides. Many found this year's exam to be quite difficult as the questions sometimes required you to think outside the box, but otherwise it was a fair exam that reflected the study material provided throughout the semester.

ACTL20002 Financial Mathematics II [SM2] (1)

Exemption status	CT1 *Financial Mathematics*, in conjunction with ACTL20001 *Financial Mathematics I*. Satisfactory performance in both subjects' end-of-semester exams is required.
Lecturer(s)	Prof Johnny Li
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour tutorial
Assessments	2 individual assignments due in Weeks 6 and 12 2 × 5% = 10% Mid-semester test in Week 7 10% 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.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2019 Semester 2

Comments

For those of you that enjoyed the routine calculations and comparisons of PV's that formed the backbone of *Financial Mathematics I*, then its direct successor, Financial Mathematics II (FMII) will initially fall right into your comfort zone. This gentle start into the subject gradually disappears and is replaced by foreign and more challenging concepts of arbitrage, replication and immunisation. The biggest challenges for the semester, however, only arise following the mid-semester exam. Drawing heavily upon certain concepts taught in *Probability* and *Statistics*, such as the Lognormal Distribution and IID returns, and extending these concepts with time-series models and recursion, you will, for possibly the first time be applying mathematical concepts beyond high school in an actuarial setting. Although the later weeks of the subject may sound quite ominous, by offering more tangible and interesting applications, FMII offers great insight into the actuarial field, helping you gauge your true passion for the major. A note for students commencing this subject post-2019: Although the subject ACTL20002 will no longer be run, some of this content will now be included in the new subject ACTL20001 *Introductory Financial Mathematics*.

Subject content

- **Week 1**: Discount Securities and Coupon Bonds
- **Week 2**: Valuation of other securities
- **Week 3**: Measuring Investment Performance
- **Week 4**: Interest Rate Analysis
- **Week 5**: Interest Rates, Arbitrage and Replication
- **Week 6**: Arbitrage & Forward Contracts and Default
- **Week 7**: Mid-semester test
- **Week 8**: IID Returns
- **Week 9**: Moments of functions of IID by Recursion and Life Assurance
- **Week 10**: The Lognormal Distribution
- **Weeks 11–12**: Time Series Models

Lectures

Lectures for FMII ran twice a week and were taught by Professor Johnny Li, a recent addition to the actuarial department at the university. With a glut of research publications, it was clear that the professor is extremely knowledgeable, and, when combined with his passion for the subject, resulted in extremely enjoyable classes that kept students fully engaged for the entirety of the lecture. Initially, we were provided with empty lecture slides which required us to fill in gaps as the lecture was presented, leading to the inconvenience of hastily copying down everything as fast as possible before the screen shifted to the next slide. However, upon being alerted of this issue, Professor Li quickly remedied the issue by releasing a fully completed set of lecture slides, alleviating the aforementioned pressures and allowing students to commit their focus to understanding the content being taught. Although this subject's content is initially rather basic, do not be fooled by its simplicity. As with all actuarial subjects, these initial weeks form the building blocks for significantly more challenging topics that arise later in the semester. Unfortunately, we were not able to cover the entirety of the planned lectures, with excel simulation and moving average processes being skipped, resulting in the scope of the assessable material being curtailed.

Tutorials

Although not compulsory, I would highly recommend attending all the tutorials for this subject. This sentiment is one that was widely held by those studying the subject, as evidenced through the consistently high attendance across most tutorial times. In particular, I found the concise recaps of the previous week's content especially helpful in consolidating my understanding.

For most weeks, there are no more than a handful of questions to be completed prior to the tutorial, so spend the time saved on ensuring you have a solid grasp of the key concepts and you will be able to complete all questions without the need to refer to your notes.

Given that past exams were not provided by the lecturer, these tutorials will also form an integral part of your exam preparations, with many of them written in a similar format to the final examination.

Assignments

Seeking to emulate what the role of an actuarial analyst will be like upon graduation, the FMII assignments were both completed on excel. These both required students to create simple financial models that were able to adjust to a variety of different inputs and were marked out of 10.

For these, I would encourage everyone to first ensure their understanding of the theory is fully consolidated before attempting to write anything in excel, as having a clear solution planned out will save you an immeasurable amount of time.

The area which may catch students unaware is that the lecturer will test this model with a variety of test cases. For us, some of these were rather extreme cases that many hadn't anticipated, thus highlighting the importance of considering all possible inputs and not restrict inputs to just the most obvious ones.

Mid-semester test

The mid-semester exam was a 50-minute closed book test without any reading time. As it only covered content up to and including Lecture 9, the scope of this exam was quite narrow. Due to this, to perform well in this assessment, it was crucial to be prepared to be tested on all the intricacies of these topics. This included being able to differentiate between forward rates and spot rates, to listing the conditions of Redington Immunisation.

Although the general sentiment coming out of the exam was that the test was fair and without any unexpected questions, I found time to be quite tight. With just three questions, the test was deceptively long. Particularly, question three was

calculation heavy, meaning that if you hadn't managed your time well, you could find yourself failing to complete the test.

End-of-semester exam

The end of semester exam was out of 53 marks and consisted of seven questions that spanned the first 21 lectures, with simulation examples being exempted. Out of these sections, the time-series models were the most challenging, as they had only been briefly discussed during lectures

Without any prior exams provided to us, most of the cohort was feeling extremely apprehensive during SWOTVAC as we were unsure how in-depth each concept could be tested. It is here that the purchase of Compound Interest and its Applications proved to be extremely helpful as it provided additional preparatory resources.

On the day of the exam, to the surprise of many students, the exam was rather straightforward and lacking extremely challenging questions to separate the cohort. As a result, many students felt that they were able to confidently answer almost all the questions comfortably within the two hours allocated for the examination.

ACTL20002 Financial Mathematics II (2)

Exemption status	CT1 *Financial Mathematics*, in conjunction with ACTL20001 *Financial Mathematics I*. Satisfactory performance in both subjects' end-of-semester exams is needed.
Lecturer(s)	Jason Davis
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour tutorial
Assessments	Assignment 1 due Week 6 — 10% 45-minute mid-semester test in Week 8 — 10% Assignment 2 due Week 6 — 10% 2-hour final exam — 70%
Textbook recommendation	None
Lecture capture	Full (both audio and video).
Year and semester reviewed	2018 Semester 2

Subject Content

- Weeks 1–2: Securities and Bonds
- Week 3: Measuring Investment Performance
- Week 4: Interest Rates and Immunisation
- Week 5: Interest Rates, Arbitrage and Replication
- Week 6: Arbitrage and Forward Contracts, and Default
- Week 7–8: IID Returns
- Week 9–10: Life Assurance Applications and Lognormal Distribution
- Week 11–12: Time Series Models and Simulation

Enjoy the sense of achievement upon successfully completing ACTL20001 *Financial Mathematics I* (FM1) before you're thrown into Financial Mathematics II (FM2). The subject started off gently with familiar securities and bonds, and relatively simple methods of measuring investment performance. Although calculating different types of rates was tedious and boring, the real-life applicability of immunisation was interesting. The ideas of arbitrage and how options and forwards contracts work were easy to take in, but using them to replicate portfolios was tricky and required a deeper understanding of the cash flows involved. Default was quite an intuitive topic which made it a nice break from the difficult subject. Then, from Week 7, FM2 became extremely difficult with IID returns, the lognormal distribution and time series models. These topics were heavily maths-based and were hard to digest. The applications in life assurance were a bit tricky but quite interesting. Overall, the FM2 subject content was a step up from that of FM1.

Lectures

Lecture slides were split into Weeks 1–6 and Weeks 7–12 and uploaded well in advance. Every lecture started with the learning objectives, alternated between theory and examples and concluded with a summary. Although theory could be learnt by reading the slides, the examples were crucial to understanding how things worked and could be applied.

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

Jason often engaged students by asking questions throughout his lectures, whether it was to check understanding of theory or to calculate a part of a problem. He also frequently showed Excel spreadsheets or pulled up other relevant information on the screen, and as these were generally hard to see, it was a good idea to sit close to the front.

Whether to attend the lectures or watch them online is personal choice, but since the lectures were at decent times, I thought I might as well attend in person. Due to the difficulty of the subject, I don't think watching the lectures online would have saved time; you probably wouldn't have understood much at 2× speed anyway.

Tutorials

People tend to get lazy when tutorial attendance is not compulsory. To be honest, I didn't attend many of my FM1 tutorials and realised during SWOTVAC (when I was going through the problem sets) that it would've been much more effective to go regularly and review at the end of the semester. So, to reduce my end-of-semester stress levels, I ended up going to all 12 of my FM2 tutorials. Since my tutorial was on a Monday morning, I sometimes struggled to find time to complete all the questions on the problem sheet in time for the tutorial, but I always read through them and at least considered how to approach them.

My tutorials were split into two sections – a review of the previous week's content and then going through the problems. The time spent on each depended on how many problems there were and how difficult they were. My tutor did not necessarily expect us to have completed all the problems but would ask us to contribute to solving the problems at times, which was a good way for us to learn from each other. Solutions to the problem sets were uploaded to the LMS at the end of the week, but I didn't refer to them until my review during SWOTVAC since I had already learnt the solution during my tutorials.

Assignments

There were two individual assignments, worth 10% each, that both involved building a model in Excel. The assignment tasks had storylines to reflect the real-life application of the financial models created, which made them interesting.

For both assignments, I had to think through the theory and how it could be turned into a spreadsheet, before being able to do anything in Excel, and I assume this is also because I had no previous experience in building Excel models. It was important to consider all possible scenarios when creating the models. Although the tasks had emphasised that the models should work for any inputs, it was easy to only think of the obvious cases.

For both assignments, after the results were released, Jason released the test cases and then kindly allowed resubmissions from students who received less than 8 out of 10 for a maximum mark of 8. Having the test cases meant that students could guarantee that their resubmission could receive an 8.

Mid-Semester Test

The mid-semester exam was a 45-minute closed-book exam with no reading time and with the usual calculator. The exam covered content up to Lecture 11 (inclusive). The exam papers and their solutions from 2014 to 2017 were provided for preparation. The solutions were very bare, often presented in tables without explanations, and questions that were bookwork did not have solutions, so it was unclear how much it would be necessary to write for theory questions.

This semester's paper was more confusing than difficult; superfluous information was provided to and a question on index-linked bonds was complicated in its definition. Consequently, many students did not do as well as they expected, which served as a lesson in how tricky FM2 could be and prepared us for the final exam.

Final Exam

The final exam was a 2-hour paper with 15 minutes of reading time and required a calculator. Like with the mid-semester exam, the 2014-2017 papers and their solutions were provided, and these solutions provided more support. Although there was some pattern to the structure of the paper, it was clear that the problems themselves could be wildly different to questions already seen, and so the final exam appeared to be a test of problem-solving ability, given the content taught.

The final exam this semester appeared approachable enough during reading time but was extremely tedious. Jason set questions that required line-after-line of working out and calculator input, which, personally, I was not expecting. Furthermore, the style of questions was slightly different to what was expected after doing past papers. Finally, many students struggled to finish the paper, with several barely reaching the last question, so maybe it would be important to also improve speed, on top of problem-solving ability when preparing for the final exam.

Concluding remarks

FM2 is significantly more challenging than FM1, but also more interesting and applicable to the actuarial field. I know people are tired of hearing about the correlation between lecture/tutorial attendance and good scores, but seriously, attending my tutorials and participating when I could provided me with the basic technical skills and the confidence I needed to tackle the harder problems in the exams. The subject required much more higher-order thinking and definitely has improved my problem-solving ability.

ECON20001 Intermediate Macroeconomics

Exemption status	CT7 *Business Economics*, in conjunction with ECON10004 *Introductory Microeconomics*. An average of 73 across this subject and ECON10004 *Introductory Microeconomics* is required, with no fails.
Lecturer(s)	Dr Mei Dong
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour tutorial
Assessments	Tutorial Participation 10% 2 × Individual Assignments 2 × 12.5% = 25% Multiple Choice Quiz 5% 3-hour end-of-semester exam 60%
Textbook recommendation	Olivier Blanchard (2017). *Macroeconomics.* Seventh global edition. Pearson. This textbook was never explicitly used, so I ✗ do not recommend purchasing it.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2019 Semester 2

Comments

ECON20001 Intermediate Macroeconomics builds on the content taught in ECON10003 *Introductory Macroeconomics*. Mei teaches the subject in a very structured manner, breaking the semester into five main sections. Overall, the subject was taught very well and relatively easy to study for.

Subject content

- Weeks 1–4: IS/LM Model
- Week 4: Unemployment Model
- Weeks 5–7: Dynamic AD/AS Model
- Weeks 8–10: Solow-Swan and Growth Models
- Weeks 11–12: Open Economy IS/LM Model

Lectures

Mei's lectures are very structured, breaking the semester into five distinct topics. Within each topic, Mei often starts with empirical evidence and a general explanation of the model's purpose. Mei builds each model up from the ground up, showing derivations within the lecture or through supplementary algebra she posts on the LMS. I spent the time understanding these derivations and found them imperative to my study; I would highly recommend going through each derivation without looking at the lecture slides. Mei often ends topics with a relatively easy question, which does not reflect the difficulty of the exam.

While the content on lecture slides are often background theory and not directly examined, understanding these concepts and derivations helped me complete the practice questions provided. As exam questions often slightly modify the models

taught in class, it is vital that you know how to derive each model and can apply these derivations to any situation presented.

Tutorials

Similar to other Economics subjects, tutorial content lagged lecture content by a week. Questions in the tutorial reflected the difficulty of the exam, so I found it helpful to go through the tutorial questions in preparation for the exam. Tutorial questions often had little tricks to them that were not taught in the lectures, so I found it important to attend each tutorial and pay attention when the tutor presented the answers. As the answers to the pink worksheets were not posted on the LMS, always copy the tutor's answer so you can review it at the end of the semester.

Multiple-Choice Quiz

As with other Economics subjects, the multiple-choice quiz was not there to trick you. In this subject, the quiz only covered the IS/LM model. Questions were extremely similar to the practice questions, so I would recommend preparing for the quiz by attempting these questions.

Written Assignments

Assignment 1 covered the IS/LM model and the Unemployment Model. Assignment 2 covered the Dynamic AD/AS Model and the Endogenous Growth Model. Both assignments were calculation heavy and required the use of Excel to iterate time paths. While the calculations were dense, most students lost marks with their explanations. Tutors looked for specific phrases and explanations with each question. To ensure you are hitting the relevant points, I would look at the explanations that were used on the lecture slides and mimic that. Students should generally do well on these assignments.

End-of-semester exam

The structure of the exam has not changed for the last few years:

- Section A: 12 Multiple-Choice Questions. Answer all questions.
- Section B: 3 Short Answer Calculation and Explanation Questions (Easy). Pick two questions.
- Section C: 3 Short Answer Calculation and Explanation Questions (Hard). Pick two questions.

The multiple-choice questions were very similar to the multiple-choice quiz. Redoing the questions from the quiz would be sufficient practice for Section A. Although multiple-choice questions were tricky in how they are asked, a little thought about each model typically points towards one answer.

Both Section B and C composed of short answer calculation and explanation questions, though Section C questions typically consisted of questions that modified the model taught in class. Section B questions were very similar to the tutorial questions and are not there to trick students. Section C questions were similar to some of the harder tutorial questions, with modifications to the model being the breaking point for most students. As the modifications are not taught in class explicitly, you must rely on the derivation shown in class. If you go back to first principles and think through each derivation, there is no modification you cannot solve.

Concluding Remarks

Overall, the subject was very well taught with Mei structuring the subject superbly. The exam was very fair, given the number of past exams and other resources provided. My biggest tip to success would be to ensure that you focus on understanding the derivation of each model from scratch. Once you can repeat the derivation without looking at the lecture slides and explain it to someone else, I would say that you are prepared for the exam.

MAST20004 Probability

Exemption status	CT3 *Probability and Mathematical Statistics*, in conjunction with MAST20005 *Statistics*. An average of 73 across this subject and MAST20005 *Statistics* is needed, with no fails.
Lecturer(s)	Dr Aihua Xia Dr Mark Fackrell
Weekly contact hours	3 × 1-hour lectures 1 × 1-hour tutorial 1 × 1-hour MATLAB session
Assessments	4 × individual assignments 4 × 5% 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. ✗ This textbook was never explicitly used, so I do not recommend purchasing it. A bound copy of the lecture slides and the prescribed problem sets can be purchased from the Co-op store. Although these were also available in PDF format on the LMS, ✓ I highly recommend purchasing this book and annotating it as you go through the semester.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2019 Semester 1

Comments

MAST20004 Probability formalises basic probability theory taught in high school and introduces students to various ways of working with probability distributions. Compared to MAST10009 *Accelerated Mathematics 2*, this subject is a lot less dense and so a lot easier to follow. At first glance, Probability seems like an application-driven subject, so it is easy to fall into the trap of grinding problem sets. However, I believe the course was structured in a manner that emphasises the concepts a lot more than students think. Therefore, I cannot stress the importance of investing time into understanding core ideas enough, and I have outlined what I did to help me grasp each topic in the **Subject Content** section below.

Subject Content

1. **Introduction to Probability**: This topic reintroduces students to high school concepts of probability – such as independence – and formalises it with definitions and axioms. Much of this topic should be a review of previous knowledge, and the concepts are generally easy to understand. I found understanding the Law of Total Probability key to some future topics, so make sure you understand its graphical and tree diagram representation.

   Judging from past exams over the last decade, the first question of the end-of-semester exam is always about probability axioms and proving probability properties. I found that these proofs almost always utilise Axiom 3, so make sure you can comfortably construct disjoint events.

2. **Univariate Distributions**: Extending upon random variables taught in high school, this topic is the foundation of the more complicated bivariate distributions topic. Pmfs, pdfs, cdfs, expectation and variance were first introduced

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

quite generally, then these concepts were applied to a variety of discrete and continuous distributions. Although the derivation of each distribution function, expectation and variance was shown, I have never seen this explicitly tested on an exam. In saying this, it is expected of you to have all of this information readily available on your cheat sheet.

Most of this topic is straightforward. I would take the time to understand how each distribution function is derived as a means of understanding the difference between each distribution. Furthermore, understanding the relationship between areas under distribution functions and probabilities is vital for understanding the next topic.

3. **Bivariate Distributions**: Whilst students were generally comfortable dealing with pmfs, pdfs, expectations and variances of univariate distributions, a second variable proved to be a significant leap in difficulty. Understanding double integration and its three-dimensional representation was key in helping me learn this topic.

   Every past paper had a question about bivariate distributions, and the tricky thing was knowing what bounds to use when integrating the distribution function. Shading the domain of the bivariate function on an x-y plane helped me see which sections I needed to integrate and proved to be a great method to answer this style of questions.

4. **Generating Functions**: I found this topic the most conceptually-difficult and confusing, as there was no way to visualise generating functions. Be open with your thinking when learning this topic and be familiar with manipulating one generating function to another.

   Students struggle most with the exam question on generating functions, as most students neglect this topic when studying. Again, be comfortable manipulating one generating function to another and make sure you can easily derive generating functions for a given probability distribution. I recommend putting the pgfs and mgfs of all probability distributions onto your cheat sheet.

5. **Stochastic Processes**: In contrast to the previous topic, stochastic processes is arguably the easiest and shortest in this course. Brush up on your knowledge of eigenvalues and eigenvectors and familiarise yourself with matrices. Besides that, this topic is very logical and easy to comprehend.

   Markov chains are set to be on your end-of-semester exam, but the questions are straightforward and asked in a very similar style to previous years. Practise these types of questions and these should be easy marks in the final exam.

Lectures

Mark and Aihua have varying styles of teaching: Aihua goes into a lot more depth with each concept and often goes on tangents, whereas Mark tends to provide just enough information for you to understand the concept. Because Mark was a lot more succinct, I preferred Mark's lecture stream. However, Mark glossed over complicated concepts near the end of the semester, so I complemented Mark's lectures with Aihua's detailed explanations. Overall, I would recommend watching Mark's lectures throughout the semester and referring to Aihua's when required.

Contrary to popular belief, I found that watching lectures online was extremely effective (perhaps more effective than attending in-person). This is because I could pause and rewind the lecture as I annotated the slides throughout the semester. Maintaining this type of note-taking gave me a very logical set of notes to read in SWOTVAC.

Tutorials

Tutorials consisted of attempting prescribed questions in small groups. I did not find it necessary to attend tutorials regularly, as I could just attempt the questions in my own time. If you are having trouble understanding the content, I would recommend going to a consultation (especially Aihua's) as his explanations are extremely clear. I had Aihua as my tutor, so I only attended tutorials when I had trouble with a particular concept.

The purpose of each MATLAB session was to visualise or simulate concepts learned in the previous week. If you think this would enhance your understanding of concepts, then I would attend. If not, the MATLAB session does not add much value. End-of-semester exams typically have a couple marks dedicated to MATLAB, and the questions are of similar style every year. Attempting past exams would be sufficient preparation for MATLAB questions.

Assignments

Written assignments consist of four or five questions, of which two questions will be randomly chosen and marked. Questions require some thinking but are generally doable. The assignments do take quite some time to write everything out, so I would recommend starting early.

These assignments were marked out of 10 (as compared to 100 in MAST10009 *Accelerated Mathematics 2*). Therefore, scoring full marks was a lot more common in MAST20004 Probability, as the rigour expected from students was lower than in *Accelerated Mathematics 2*.

End of Semester Exam

The 2019 end-of-semester exam was out of 110 marks. Aihua wrote this exam, and it was extremely similar to 2018's exam (which he wrote as well). I followed the style of most past exams, so the best preparation would be to do the past exams provided. Every question was broken up into sub-parts of which each one was worth around 2-3 marks, which together spanned the entire syllabus. It is therefore vital that you are familiar with the question-types over the entire course.

MAST20005 Statistics (1)

Exemption status	CT3 *Probability and Mathematical Statistics*, in conjunction with MAST20004 *Probability*. An average of 73 across this subject and MAST20004 *Probability* is required, with no fails.
Lecturer(s)	Dr Damjan Vukcevic Dr Tingjin Chu
Weekly contact hours	3 × 1-hour lectures 1 × 1-hour tutorial 1 × 1-hour laboratory session
Assessments	3 × Individual Assignments 20% R Computer Test 10% 3-hour end-of-semester exam 70%
Textbook recommendation	R. Hogg, E. Tanis, and D. Zimmerman. *Probability and Statistical Inference*. 9th Edition, Pearson, 2015. This subject is based on Chapters 6–9. This textbook was never explicitly used, so I ✗ do not recommend purchasing it.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2019 Semester 2

Comments

MAST20005 Statistics utilises the concepts taught in MAST20004 *Probability* to formalise basic statistical concepts. The course was broken into 11 modules, with each week of lectures covering one module. Similar to MAST20004 *Probability*, Damjan ensured that all material covered in class was also recorded on lecture capture. As such, I found it very effective to watch these lectures online.

Compared to MAST20004 *Probability*, MAST20005 was a lot more theoretical. Initially, I found it very difficult to comprehend the statistical concepts, as they cannot be visualised easily. Instead, statistical concepts relied more heavily on mathematical logic and understanding statistical tests on a more holistic level. Taking the time to process the purpose and overall story of each test was critical in my understanding of each concept. I would highly recommend focusing your time on understanding the story of each test instead of grinding questions.

Subject content

Module 1: Introduction and Review of Probability

This module was a quick and dirty review of probability theory from MAST20004 *Probability*. All material covered in this module was assumed knowledge.

Module 2: Point Estimation

Module 2 formalised the concepts of statistics and introduced the concept of estimators. Take the time to understand the subtle difference between an estimator and an estimate, as well as the difference between a sampling and a population distribution. At the heart of these concepts is the notion of a random variable, so make sure you are very familiar with MAST20004 *Probability*.

Understanding the Method of Moments and Maximum Likelihood Estimators is also key, as it forms the foundation of other modules like Bayesian Methods. These methods of generating an estimator were not hard to understand.

Modules 3 & 4: Interval Estimation

This module focused on creating confidence and prediction intervals. While the process of doing so is not hard to memorise, I would encourage you to try and visualise the process of creating an interval estimate. This relies on understanding probability distribution functions and how they shift.

Module 5: Single Variable Regression

Regression was one of the easiest modules in the course, as these concepts can be visualised easily. There are a lot of formulae in this module, make sure you write all of them down.

Module 6: Hypothesis Testing of Mean, Variance and Proportions

Module 6 was very similar to Module 3, only instead of creating confidence intervals, you utilise the same pivots to run a hypothesis test. This module is the start of hypothesis testing, and I would recommend you to first understand the logic of testing a null hypothesis against an alternative hypothesis.

Module 7: Distribution-Free Testing

Module 7 introduced hypothesis testing methods that did not assume a population distribution, and as a result, the complexity of the subject quickly increased. The lecture steps you through the process of running each test, but I encourage you to ask yourself why each subsequent step is taken. This will allow you to join the dots and formulate a cohesive story for each test.

Module 8: Analysis of Variance (ANOVA)

ANOVA topped the semester as the most difficult module in my opinion, primarily because the concepts were incredibly complex. Damjan demonstrates a visual representation of ANOVA, and I found this to be fundamental to my understanding of ANOVA.

Module 8 is broken up into three types of analysis: one-way ANOVA, two-way ANOVA and two-way ANOVA with interaction. Once I saw these three methods as separate, I found ANOVA a lot easier to understand. Furthermore, I found that explicitly proving the distribution of the sum of squares to be extremely helpful in my understanding of ANOVA. Knowing the degrees of freedom of each ANOVA test is vital for answering exam questions.

Module 9: Order Statistics, Quantiles and Resampling

The difficulty of the content begins to drop from Module 9. While the proof of the distribution of order statistics is initially complex to understand, running through the derivation a few times made it clear. Writing the formula for the distribution of order statistics is mostly sufficient for examination purposes.

Module 10: Bayesian Methods

Understanding the story of Bayesian Methods is the key to this module. Bayesian inference is inherently different from classical inference; Damjan makes this clear throughout his lecture. Make sure you understand how a posterior function (a) relies on an assumption of the prior distribution and (b) utilises the data that is collected.

Module 11: Asymptotics and Optimality

This topic was not too difficult to comprehend, as it focused on showing a process that can be easily understood. Ensure that you know how to derive the Cramer-Rao Lower Bound as this is frequently assessed.

Lectures

I found it very effective to watch the lectures online, as I could pause the lecture and make notes on the lecture slides when necessary. Maintaining this type of notetaking gave me a very logical set of notes to read in SWOTVAC.

Damjan stepped through each concept quite methodically and adds necessary comments to aid understanding. Tingjin is also a great lecturer, but I found his accent difficult to understand at double speed, as a result, I mainly relied on Damjan's lecture stream.

Tutorials and Laboratory Sessions

Like other mathematics subjects, tutorials consisted of attempting prescribed questions in small groups. I did not find it necessary to attend tutorials, as I could just attempt the questions in my own time. The tutorial questions were not pivotal to understanding the concepts and tests taught in class, so I did not attempt tutorial questions until the exam period. I found this to be quite effective, as I effectively had questions to test whether I had understood each concept and test correctly.

I did not attend a single laboratory session and thought it was effective to do it myself at home. Answers were provided for each lab session, which made it easy to self-study. I would highly recommend doing all the laboratory worksheets before the computer test, as the questions in the laboratory worksheets utilised the same functions that the computer test covered.

Assignments

Assignments consist of some R-code questions and some classic calculation questions. The questions require some thinking but are all doable. The assignments also take quite some time to write everything out, so I would recommend starting early. Ensure that you format the R-code according to the requirements.

End-of-semester exam

The 2019 end-of-semester exam was out of 80 marks and seemed to be more difficult than past exams. Damjan does not seem to follow a particular style in exam-writing, so questions were all quite different from past exams. Every question was broken up into sub-parts worth around 2-3 marks each and spanned the entire syllabus. It is therefore vital that you are familiar with the question-types over the entire course.

Questions started off relatively easy, focusing on stock-standard tests and calculations, before transitioning into more complex situations. The easy questions were similar to tutorial questions and so the tutorials form great preparation material for these. The harder questions generally set out assumptions that you were required to rely on in the sub-questions. Initially, I got into the trap of making additional assumptions to simplify the question before realising my mistake. It is vital that you only rely on the assumptions set out in the question, so I found it helpful to consciously mark out all assumptions being made.

Although the lectures go through detailed derivations of all concepts, no proofs are tested on the final examination. All questions simply needed the running of a test or the use of a formula. I encourage you to write every single formula on your cheat sheet in an organised manner, as you never know what variation of each formula will be examined.

MAST20005 Statistics (2)

Exemption status	CT3 *Probability and Mathematical Statistics*, in conjunction with MAST20004 *Probability*. An average of 73 across this subject and MAST20004 *Probability* is needed, with no fails.
Lecturer(s)	Dr Damjan Vukcevic Dr Allan Motyer
Weekly contact hours	3 × 1-hour lectures 1 × 1-hour tutorial 1 × 1-hour computer lab session
Assessments	3 individual assignments 20% 45-minute computer laboratory test 10% 3-hour end-of-semester exam 70%
Textbook recommendation	Hogg, R. V., & Tanis, E. A., Zimmerman, D. & (2015). *Probability and Statistical Inference* (9th ed.). Boston, US: Pearson Education. This subject is based on Chapters 6-9. I personally did not use the textbook as the lectures notes provide sufficient information. Specific problems from the textbook are listed in LMS for those who want extra practice. Copies are available in the ERC High Use.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2018 Semester 2

Subject content

- Module 1: Introduction and revision of probability
- Module 2: Point estimation
- Module 3: Interval estimation: Part 1
- Module 4: Interval estimation: Part 2
- Module 5: Regression
- Module 6: Hypothesis testing
- Module 7: Distribution-free methods
- Module 8: Analysis of Variance
- Module 9: Order statistics, quantiles & resampling
- Module 10: Bayesian methods
- Module 11: Asymptotics & optimality
- Module 12: Revision of 2017 past exam paper

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

Lectures

You can enroll in either Allan's (morning stream) or Damjan's (afternoon stream) lectures. You don't necessarily have to go to the lectures as all the handwritten notes will be uploaded to LMS at the end of the day. At least half of the students took this subject as an online course according to the lecture attendance rate. Damjan sometimes spoke very softly in lectures but his explanations were overall clear. You may prefer to listen to his recording. I personally went to Allan's morning lectures to push me out of my bed.

One of the most challenging parts of the subject is that each lecture contains lots of information, and sometimes the concepts can be too abstract to absorb in one hour. I wish more worked examples could be given in the lectures to help solidify the content understanding.

Tutorials

Similar to other math subjects, tutorials are conducted in a group setting which encourages students to work together. Attendance is not compulsory and tutorial problems and solutions are released online. Don't panic if you find the lectures a bit confusing at the end of the week since the tutorial questions serve as a good opportunity to enhance your understanding of the subject. I usually did some of the tutorial questions beforehand so I could leave the rest for the tutorial and finish all of them on time. If I had time left over, I would ask for more clarifications on the lecture notes as I didn't bother to go to the consultations.

Computer labs

There is one one-hour lab per week immediately following the tutorial. Lab notes, exercise and solutions will be on LMS. Most students found one hour inadequate to complete all the questions. I would recommend everyone to read through the lab notes before every class, this will let you get the most from that class with your tutors present.

Piazza discussion forum

You can easily get help from your classmates and teaching staff in Piazza. Generally, you will get a reply from the instructors within one day. Any questions and clarifications about the assignments can also be posted. Everyone benefits from the discussions and it saves you effort from going to the consultations.

Erata

The Errata page is to update corrections to errors in the lecture notes and other learning materials. It may not include every error so do ask if unsure.

Assignments

There are three individual assignments and each is given two weeks to finish. Assignment questions are slightly more difficult than tutorial questions, which allow deeper understanding of the content covered. I personally found the assignments quite useful in helping me catch up with my R study. As R knowledge is essential for some assignment questions, I felt I had a better command of it every time I completed my assignment.

Laboratory test

The 45-min lab test is held in week 12. A computer lab test was made available early in the semester to give us a sense of what a typical lab test looks like. One or two questions in the lab test were basically the same as the sample

questions. I recommend everyone print out the learning materials during the semester as you may bring any of them (lecture slides/notes, tutorial problems and solutions, lab notes and solutions) to the lab test.

Final exam

You will get the most out of 2017 Past Exam Paper as it was designed by Damjan. There is one question in the 2017 exam which was quite similar to the 2018 exam. Past exams from previous years are also good practice resources but the solutions are not given so you have to rely on group discussions, consultations or the discussion forum to check answers. From what I've heard, most people found the 2018 statistics final exam relatively easier than the 2018 probability final exam, and the results have also shown this.

Other comments

According to the mid semester subject survey, roughly half of the students found the pace of the subject fast and difficult. The average hours of work outside classes were 5 hours.

It is a challenging subject but you will do well if you make use of the available learning materials and get as much practice and feedback as possible.

MGMT20001 Organisational Behaviour [SUM]

Exemption status	None.
Lecturer(s)	Ms Lily James
Weekly contact hours	2 × 1-hour lecture 2 × 1-hour tutorial 2 × online tutorials
Assessments	Tutorial attendance and participation 10% Individual assignment, due in Week 2 10% Group assignment, due in Week 5 30% 2-hour end-of-semester exam 50%
Textbook recommendation	McShane et al. (2016). *Organisational Behaviour: Emerging Knowledge. Global Insights*. Australia: McGraw-Hill. ✓ I would recommend having one as it assists in understanding the different theories which can get a little confusing.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2019 Summer Term

Comments

For most actuarial students, if not all, this will be the first reading-heavy, content-heavy and writing-heavy subject that they encounter. Unlike your other subjects, there is absolutely no mathematics in this course, and many of you may find yourself out of your comfort zone. The subject and content itself however, whilst notorious for its group assignment worth 30%, is quite fascinating to study, and the research that you will be asked to do will assist you in the future if you decide to pursue a life in academia. Doing this subject during the summer term means that the time period given to you for every assignment is halved, so it is important that you manage your time, especially with your group. More on this later.

Subject Content

- Week 1 (1): Introduction & Contrasting Management Approaches
- Week 1 (2): Teams & Leadership
- Week 2 (1): Perception, Attribution and Decision Making
- Week 2 (2): Values, Attitudes and Behaviour
- Week 3 (1): Motivation
- Week 3 (2): Conflict & Negotiation
- Week 4 (1): Organisational Change
- Week 4 (2): Organisational Communication
- Week 5 (1): Organisational Culture
- Week 5 (2): Power & Influence
- Week 6 (1): Organisational Strategy and Structure
- Week 6 (2): Ethics

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

Lectures

The lecturer invites students to participate during the lecture significantly more than in other subjects you will take in this course. Whilst the lecture slides include most of the content you need, I would still recommend attending the lectures or at least watching them, as this will help immensely with your understanding of the myriad different concepts and theories taught. Although I would not say that readings are essential, doing it will assist you in following the lecture.

Tutorials

Participation marks in this subject are very subjective and is heavily dependent on who your tutor is. As there is not a specific measure of participation, it may simply be a comparison with others in your tutorial. Other than that, tutorials are mostly used to go over the content from the previous lecture, and this is done is different ways. Usually they are done in a form of group task, which help students to fully understand the theories and content. Online tutorials are done as a sign of participation as well, representing your pre-tutorial preparation. Whilst they tend to be quite tedious, it is good to have a shot so you have something to discuss during the tutorial.

Assignments

Your first assignment is due in the second week, noting that this is following a summer semester timeline. It is a written case study analysis, and as most actuarial students will not have done such assignments during their first year, this may come as a shock for some students. Use the first individual assignment as a learning opportunity. At the end of the day, it is only worth 10%, so utilise this as a chance to figure out what is expected for this subject. Draw upon the feedback and use this to build the foundation for your next 30% group assignment. Groups are decided by the teaching team and were based on your personality/abilities. As mentioned earlier, because of the short time frame, it is crucial that you and your team cooperate to maximise the productivity of your meetings. My team always ended up getting distracted during the meeting, and hence our first few meetings were not utilised well. We fixed this issue by creating a plan for the meeting and setting a strict time limit to each of them.

End-of-Semester Exam

The final exam is 2-hours long and is separated into two parts. The first half is based on a micro-topic, and you must use examples from the interactions within your group assignment team in conjunction with the theories taught in lectures. This part is worth 25% of the final exam. To prepare for this, regularly take note of the interactions that occur within your team and try to make links to the topics you have studied. The second half of the exam will be on a random selection of a macro-topic, together with a case study. I studied by highlighting and making notes of each relevant macro-topic in the selection of case studies given. Be concise and clear with your answers as you may run out of time otherwise. Plan your answers before you start writing in order to maximise your efficiency and minimise mistakes!

MGMT20001 Organisational Behaviour [SM1]

Exemption status	None.
Lecturer(s)	Dr Victoria Roberts (Head tutor) Professor Bill Harley
Weekly contact hours	1 × 1-hour lecture 1 × 1-hour tutorial
Assessments	Tutorial attendance & participation and completion of online tutorial 10% Individual assignment, due in Week 4 10% Group assignment, due in Week 9 30% 2-hour end-of-semester exam 50%
Textbook recommendation	McShane et al. (2016). *Organisational Behaviour: Emerging Knowledge. Global Insights*. Australia: McGraw-Hill. The textbook was useful in drawing references for both the individual and team assignment, and also to provide additional depth into topic content. Although textbook readings were recommended weekly, lectures proved sufficient enough.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2018 Semester 1

Comments

Welcome to your first taste of a management subject! Because of its reputation of being a reading-focused subject, most students had mixed opinions about this subject. You may find this subject quite different compared to the other core subjects undertaken in Commerce, as this subject heavily focuses on reading and writing - requiring you to be able to absorb a considerable amount of information and effectively be able to condense it into essay writing. Being a core subject, the advantages were the abundant access to resources and being able to collaboratively learn with others due to a large cohort undertaking this subject, as well as the addition of many past students' resources.

Subject Content

- Week 1: Introduction & Contrasting Management Approaches
- Week 2: Teams & Leadership
- Week 3: Perception, Attribution and Decision Making
- Week 4: Values, Attitudes and Behaviour
- Week 5: Motivation
- Week 6: Conflict & Negotiation
- Week 7: Organisational Change
- Week 8: Organisational Communication
- Week 9: Organisational Culture
- Week 10: Power & Influence
- Week 11: Organisational Strategy and Structure

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

- Week 12: Ethics

Lectures

Lectures were 1 hour per week , with Weeks 1-6 focusing on the 'micro' topics and Weeks 7-12 focusing on the 'macro' topics of the subject. I found that watching the lectures online on double speed was sufficient enough to understand the content, and I referred to the textbook if certain lecture slides weren't expanded on enough, such as the types of bias in Week 3, which Vicky told us would be expanded more in the textbook. In Weeks 2, 8 and 9 lectures were presented in an 'online lecture' format which were prerecorded clips uploaded on Vimeo. Although the aim of this was for students to be able to draw from interactive examples and apply the content's material into 'real world' examples, occasionally it felt like an overload of unnecessary information to tediously follow. It felt as if the slides had not been updated in a long time which further made it harder to pay attention.

Apart from the online lectures, Vicky was an excellent lecturer who clearly explained and expanded on each lecture slide succinctly which made understanding the content much easier. I recommend either to attend/watch Vicky's lectures, as she explains the content straight to the point and her interactive approach in occasionally asking questions to students made lectures more enjoyable and easier to retain information.

Tutorials

Tutorials were conducted as a combination of a weekly online tutorials and 1 hour in-class tutorials. The online tutorials essentially acted as a learning tool that converted the concepts and content in lectures into a quiz format . They were in the format of a survey/questionnaire where answers had to be typed into the given boxes below each question. No time limit was given to do this, however the same browser and web activity had to be active in order to go back and save your answers. They took roughly one hour to complete if answered sufficiently. It was to be completed prior to your tutorial each week so it is recommended you do not put your tutorial too early in the week as our lectures were every Friday, and online lectures only opened on the Monday at the beginning of each week. However, if you are incredibly responsible and on top of all your work, feel free to not heed this advice. Completing the online tutorials each week helped to better follow class discussions in the in-class tutorials as the questions discussed in the in-class tutorials were from the online tutorials.

Participation marks were obtained from mainly 2 sources - completing the online tutorial each week and participating in class discussions in the in-class tutorial. Although it may seem tedious and even dull at times completing the online tutorials, writing all your answers down beforehand made it much easier to contribute in the class discussions since you could simply just draw on the points you wrote down beforehand. It was also interesting hearing the tutor and other student's perspectives on certain questions/topics, providing you with a greater insight into the varied perspectives on the topic.

Assignments

An individual assignment was due in Week 4 worth 10%, expecting you to recall the past 3 weeks of content to apply to the questions asked in the assignment. A case study was given to us and 3 questions referring to this case were to be answered with a 1000 word limit, drawing on concepts learnt in lectures and readings. The required readings given to us to complete the assignment was the longest process, in terms of reading through and analysing. The research component of assignments will inevitably take longer than writing the actual essay itself, so my advice is not to worry if you feel as if you are behind, as writing the actual essay will take the shortest amount of time (given you plan out and do sufficient research prior). An abundance of resources were given by the department regarding how to format and write your essay, as this was most student's first taste of academic essay writing during their time in Commerce. Although optional, utilise these resources - I found them to be the most helpful, as tips were specifically given into how to approach and target key points in the questions to effectively shape your answer.

The team assignment, although being known for being extremely rigorous was not too difficult as the support of the department and your team mates guided you to be able to adequately complete the assignment. This was due in Week 9 and was worth 30%, so it is recommended you spend considerable time and commitment for this assignment to the best of your efforts. With the OB department providing you a guideline on how to approach to the team assignment, and the tutor's feedback, it was a relatively smooth experience. The 5000 word limit and the length of the case study may be daunting at first, but sharing the workload with your team mates made it reasonable to work on. Given you effectively plan out the completion of each process in the assignment, it was a fine experience. Pay attention to your experience with the team, as this will be asked to be drawn upon in the final exam.

End-of-Semester Exam

This year's exam threw a curveball at us, by asking the micro question about discipline which most people skipped over in the lectures and knew nothing about. Advice: READ EVERY SINGLE SLIDE, no matter how mundane and far fetched they are. Learn from our experience, you could still be asked on it. The macro question was straightforward- requiring us to draw upon on the 3 dimensions of power to the Sanrizz case which was suspiciously very similar to the previous past exam questions on power. In my experience in studying for the exam, you could only memorise so much, thus learning off the lectures was adequate by itself. I found that especially for the macro cases, analysing each case with each examinable macro topic (16 combinations in total) was useful and made memorising the macro content come more naturally.

Concluding Remarks

Overall OB is very well-structured subject and as long as you put in reasonable amount of effort you will be fine. Be very careful for the final exam and read everything in detail and attentively .

MGMT20001 Organisational Behaviour [SM2]

Exemption status	None.	
Lecturer(s)	Prof Graham Sewell Dr Joeri Mol Dr Melissa Wheeler	
Weekly contact hours	1 × 1-hour lecture 1 × 1-hour tutorial	
Assessments	Tutorial participation (incl Online Tutorial) Individual assignment, due in Week 4 Group assignment, due in Week 9 2-hour end-of-semester exam	10% 10% 30% 50%
Textbook recommendation	None	
Lecture capture	Full (both audio and video).	
Year and semester reviewed	2018 Semester 2	

Overview

This subject is a pretty straightforward subject once I understood that the primary test of Organisational Behaviours (OB) was not in my research or writing skills, but the ability to apply the course theories accurately and in depth to the examples and case studies covered in assignments and exams alike. Of course, this does not mean you are not required to research properly or write eloquently, these skills will only augment the quality of your work. However, my key advice is not to get boggled by the technicalities of finding 10 scholarly articles or finding the exact word, but to understand the theory in detail, extensively list the components of the theory to examine, and apply it thoroughly to the case study.

Lectures

In all honesty, I stopped watching the lectures for OB religiously around week 5 when I realized the slides listed out the theory comprehensively. The lecturers offered a more detailed cover of the theory through examples and additional explanations. However, at times those specifics did not clarify the theory as well for me as going through the slides and listing the components of theory in isolation.

Micro topics:

- 1: Introduction
- 2: Perceptions and Attributions
- 3: Teams and Leadership
- 4: Values, Attitudes and Behaviour
- 5: Motivation in Organisations
- 6: Conflict

Macro topics:

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

- 7: Change – Model (why, who, what, which, how), 6 silent killers
- 8: Communication – Functional model, meaning centric model, metaphors
- 9: Culture – Integrationist, differentiationist, critical
- 10: Power – First, second, third degrees
- 11: Strategy and Structure
- 12: Ethics

Tutorials

Go to the tutorials. Other than the fact that there are tutorial participation marks, discussing the ideas around the theory, how it applies to the case study, and more importantly how to apply it to the case study builds up on the skills that OB assesses and examines you on.

Assignments

The assignments you will do are firstly, a 1000-word essay on the first 3 micro topics and secondly, the much feared and hated 5000-word group assignment based on all the micro topics.

As always, get started early on these wordy assignments that expand to fill the time allocated. Getting a grasp on researching, accessing and searching for articles, skimming through the essays are all very time consuming. However, when writing I realised it is not quite the quality of the essays you find but the sophistication of application of the case studies to the theory that is important. It is simple to summarise the key theories of every lecture into a handful of items in a list, and for me, being clear on the theories to mention and pay attention to while writing improved the assessment of my work. Make sure you have all these skills and have finished the components of Assignment 1 by the Week 2 as it is due in Week 3.

With the group assignment I was pretty lucky, as unlike many people, I had a wonderful time working with my companions and we worked pretty harmoniously the entire period. The first meeting is essential to setting the right tone of the entire process. Key values you should establish and continuously enforce and exemplify are: 1) Honesty, 2) Being keen and making sure to set deadlines a bit early, 3) Clear communication, 4) Some form of friendship. The honesty helps makes it clear who is working on what, who is busier in this time period, who hates researching but is willing to write more, etc. Being keen and energised every meeting makes it clear that slacking off is not an option and helped my teammates and I stay on the wagon and not slip off. Clear communication and some friendship deter people from free loading in the group.

Generally, just try to be nice and include people in the group so they feel like they do have responsibilities and commitments they need to uphold instead of it being an assignment. Sounds simple, but its more significant than it seems. I found reminding people of the group assignments they've had where there was dead weight also helped, as no one wants to be that person.

On a more structured note, every weekly meeting we made sure to:

1. Set out steps we needed to complete during the week, making sure we were speeding along as fast as possible to prevent a freak-out before the deadline
2. Set out a general plan of overall milestones we needed to hit each week
3. See if there was any way we could speed up the process to ensure a calm submission
4. Clearly set out responsibilities of each team member
5. Discuss ideas, consider the meaning of the theories and sort out the hierarchy of topics (ie. Work satisfaction is based on team dynamics which is set by leadership style so we wrote our essay in the reverse order) so everyone

understood the theory better by the end of the meeting and by the time we started writing, everyone knew what we were writing about

During the week, whoever had the most free time would end up following up on everyone else's progress so there was no slacking off.

Exam

The exam is organized into 4 questions. Question 1 is centred around a micro topic and questions 2-4 are centred around a single macro topic in conjunction with one of the case studies you will cover every week of the macro lectures.

Question 1 is pretty straightforward and is similar to Assignment 1, but you will use your own group experience as a case study.

Questions 2-4 are annoying as out of the 4 topics and 4 case studies, you may be tested on any combination. There is a maximum of 14 possible combinations to study, as ones already covered during the semester won't be tested, however, only one will be examined.

It seems dire as the best way to study seems to be to analyse every combination individually, keep those ideas in your mind and replicate them during the exam. However, you can break down every macro topic into 3 sub topics (and hint hint there are 3 questions), learn the features of the 3 subtopics and also learn how to identify them in the case studies. Then, in the exam, just make sure to explain the theories using examples from the case studies and also elevate your analysis by providing reflection or recommendations to nail the basics.

Concluding Remarks

Although OB seems like a tedious subject to do and everyone seems to complain about it, I personally enjoyed writing about common sense, analysing the ideas explored in lectures with my teammates and honing those English essay writing skills.

Third-Year Subjects

Contents

ACTL30001 Actuarial Modelling I (1)

Exemption status	CT4 *Models*, in conjunction with ACTL30002 *Actuarial Modelling II*. Satisfactory performance in both subjects' end-of-semester exams is needed.
Lecturer(s)	Professor David Dickson
Weekly contact hours	1 × Set of online videos (adding up to roughly 1 hour) 1 × 1-hour workshop 1 × 1-hour tutorial
Assessments	50 minute mid-semester test, held in Week 8 10% Group assignment, due in Week 10 10% 2-hour end-of-semester exam 80%
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. The textbook is ✗ not necessary as all required material is provided in the slides. I personally did not use the textbook.
Lecture capture	Online lecture is recorded with video. However, workshops are not recorded.
Year and semester reviewed	2019 Semester 1

Comments

When the lecturer emails- "a large number of you applied for special consideration" in one of the smallest cohorts, you know you're in for a good time. If you thought that the step-up in difficulty from first-year to second-year was rough, be prepared for the worst. Actuarial Modelling I is a subject rife with arduous proofs and leftover gifts from second-year abominations, *Statistics* and *Financial Maths II*. Yet, beneath the tough mathematical derivations, lies a juxtaposing simplistic and familiar essence of *Introduction to Actuarial Studies*. Actuarial Modelling I is not for the faint-hearted. For those of you who think you may not be suited for actuarial studies, this is where you will be caught in the filter that is the alternative actl/eco/finance split major.

Subject Content

1. Modelling Mortality; future lifetime as a random variable, life tables, expectation of life, laws of mortality and fractional age assumptions. This section works with probability functions.
2. Non-parametric methods; Kaplan-Meier estimation, Nelson-Aalen estimation and Proportional Hazards model.
3. Estimating Mortality rates; Two-state Markov model, The Binomial Model, The Poisson Model as well as the comparison of these models.
4. Multiple State Models; Looks at using models with more than two states, for example, healthy-ill-dead, to estimate the probability of transition from one state to the other. This process involves solving linear ordinary differential equations.
5. The Poisson Process; Looks at the mathematical properties of the Poisson process and its application.

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

6. Simulation; Looks at the theory of simulating values using random numbers as well as application of simulation under discrete and continuous distributions.

Lectures

I did not attend lectures, which may well be the worst decision of my uni career so far. Not because the LMS material for this subject is suboptimal, but instead because it is vital that you do not fall behind - I had crammed every previous maths subject in four days thus far, but not even two straight weeks of only AM1 was enough for this subject.

Regardless, the lecture slides for this subject were clear and concise, with only one or two blank areas that needed to be filled out. They were beautifully succinct to such an extent that often, I would stop on one page for half an hour at a time to comprehend the derivation.

The lecture recordings were uploaded to Vimeo in videos that were each about 3 minutes long, alluding to only a few pages at a time. Consequently, it was easy to find the exact recording for the section I was looking for, but difficult to be absorbed into the process of lecture-watching, as I would have to load a new webpage every few minutes. You can find a code to allow you to change the viewing speed of Vimeo videos by simply Googling, which I personally recommend, as I believe that Dickson's pace is well suited to 2x speed.

Tutorials/Workshops

Having only attended two, I do not have the best idea of how these are run. However, the exam, to someone who had minimal exposure to the possible questions they could ask of you, felt completely different from the practise exams and the material that was available on LMS. Following this notion, I would highly recommend that you attend tutorials to maximise exposure to practising and working through various questions, as tutorial questions will not be posted onto the LMS.

My deepest regret is walking out of the exam, feeling lost, only to have friends say, "this was derived in the tutes/workshops".

Group Assignment

For the assignment, I was automatically placed into a group of four. Luckily, my group was very productive and willing to work together. The assignment had some conditions that had to be fulfilled that made it difficult; many students struggled to fit all of their responses to questions into an A4 MS Word document. For this reason, I recommend completing the assignment and using LaTeX to present the final document (go to our annual LaTeX workshop if you can't!) Additionally, we were required to submit the document with a photograph of all of the group members together, likely to create some real-life interaction between peers. This was an interesting concept, and I'm thankful for it, because I would not know what my group members look like otherwise.

Mid-Semester Test

The mid-semester exam is similar to the specimen and therefore deceptively easy. The average mark for my year was 7.36/10, which was followed by the remark from Dickson, "If you scored 8 or above you are on track for exemption standard in this subject. If you scored below 6.5 you should be concerned about whether you will pass the final exam, which is a hurdle requirement for the subject."

End-of-Semester Exam

As I have previously mentioned, this exam was quite unlike the specimen exam, of which we were only given one. This made practising exam technique and exam-styled questions quite difficult, as the only reference was not ideal. Except for the previously derived Kolmogorov proofs and other proofs, the only similar questions between the specimen and actual

exam were the rare computation questions in this subject. The exam mostly consisted of questions that you could either do entirely or not at all. Given how difficult you now know this subject is, be sure not to underestimate it!

Concluding Remarks

It's no wonder that the dropout rate at the end of first semester of third-year is historically disproportionately high. Good luck my fellow budding actuaries, and, as I like to say, see you next year!

ACTL30001 Actuarial Modelling I (2)

Exemption status	CT4 *Models*, in conjunction with ACTL30002 *Actuarial Modelling II*. Satisfactory performance in both subjects' end-of-semester exams is needed.
Lecturer(s)	Professor David Dickson
Weekly contact hours	1 × Set of online videos (adding up to roughly 1 hour) 1 × 1-hour workshop 1 × 1-hour tutorial
Assessments	50 minute mid-semester test, held in Week 7 10% Group assignment, due in Week 10 10% 2-hour end-of-semester exam 80%
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. The textbook is ✗ not necessary, as the notes provided are sufficient for study. The textbook may provide more questions to practice on, however there are already plenty of questions provided in the tutorials and workshops to work on.
Lecture capture	Online lectures are uploaded well in advance. Workshops are not recorded.
Year and semester reviewed	2018 Semester 1

Subject content

ACTL30001 Actuarial Modelling I returns to some of the content taught back in ACTL10001 *Introduction to Actuarial Studies*, focusing on techniques relating to life insurance and modelling mortality rates. The subject is split into the following six sections:

- **Modelling Mortality** — This lays the foundation for the rest of the subject, defining a lot of the notation and concepts used in later topics, and it draws upon things from two years ago, so it may seem familiar. Some areas may seem like it isn't important, but be very careful: unless explicitly stated, all topics are in the realm of being tested or examined.
- **Non-Parametric Methods (Estimation)** — A more calculation-focused topic, looking at estimates of mortality rates using different methods of estimation. Potentially one of the easier topics and ability to earn some decent calculation marks, but derivations and proofs could be difficult.
- **Estimating Mortality Rates** — Another very large unit in the subject along with Modelling Mortality. Draws upon some knowledge in Modelling Mortality, and some knowledge of distributions in MAST20004 *Probability*, including the Binomial Distribution, Poisson Distribution and general ability to deal with distributions. A more difficult unit that focuses more on derivation and proofs rather than computation.
- **Multiple State Models** — This topic explores more states other than just being Alive and Dead, and my personal favourite topic. Many answers can be derived intuitively. It is quite algebra heavy with use of up to second order differential equations, but a strong understanding of the reasons behind the algebra will make this topic much simpler.
- **The Poisson Process** — Touched upon in *Probability* , but delved deeper in this subject. A shorter topic, and uses

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

some knowledge of MGFs and PGFs.

- **Simulation** — The shortest topic of the subject, spanning only a week or so. Revisits techniques used in ACTL20002 *Financial Mathematics II*, but applied in a life insurance setting.

Lectures

Lectures are pre-recorded online and uploaded to Vimeo by Professor David Dickson. They come in bite-sized chunks of about 10 videos per week, with each video covering one or two pages, with lengths of 2 to 6 minutes, depending on the section being covered. A unique method of providing information, but I quite enjoyed it. Being uploaded in small chunks allows you to keep focus, and very quickly refer to a specific video if you are having difficulty with a page.

The lecture notes are provided; they are very structured and thorough, and you'll be nearly solely relying on this for the subject. Analyse everything in close detail, especially the proofs and derivations.

The benefit of having lectures online is the ability to fit in a workshop to the schedule, which is extremely beneficial to attend. Going through exam-styled questions in class and explaining them aids the learning process. Some questions are done through polls, and are quite engaging. Although not mandatory, these are also not recorded, so doing well in this subject requires attendance of these workshops. These questions, however, are posted on the LMS along with solutions, albeit with some delay to encourage attendance.

Tutorials

Tutorials are not mandatory, but are still pivotal to attend. There is plenty of practice available each week, and it includes problem sheets (to be done and corrected in your own time), and tutorial questions (completed in class and feedback provided by tutors). The tutorial questions are not uploaded online.

In class, students will work in groups on specific questions and present them to the class, and each group is typically allocated a single question. Given this fact, it is important to work on these questions in your own time as well. I found it helpful to listen to others for the other questions to get some sort of an idea of what to do, and work on it in detail after the tutorial.

The practice you receive each week cover a large amount of content. If you're able to complete tutorial questions, problem sheets and workshop questions well, then you would be quite well prepared for the final exam. Many proofs and derivations are not asked in the questions in the tutorials or problem sheets, so ensure you get practice of proofs and derivations as well.

Assignment

The subject only has one assignment worth 10% of your final mark. It is an Excel-based group assignment split into two questions. The first of which was to draw a graph for survival estimation (used in one of the topics), and the second was to estimate a mortality rate using MLEs.

Given it is a group assignment, many groups just complete it individually, then come together to check solutions, and often, only one person's Excel is picked. A write up is also required, so there is some level of task allocation involved, but even so, it is recommended to do the write up individually so that everyone is able to get some practice.

The Excel component is not only marked by a correct solution, but also presentation of the spreadsheet and whether it is easy to understand or not. This means that students should generally try to find a solution first, then find ways to either make it more efficient, improve the method used to getting the solution and generally make the spreadsheet presentable.

Mid-Semester Test

The MST is worth 10% of your final mark, and covers the first two topics in the subject (Modelling Mortality and Non-Parametric Methods). In our semester, there were many surprise questions on the MST (as mentioned in Subject Content above, all areas could be assessed, so be careful!).

The MST was situated in week 7, somewhat later than most MSTs, despite only covering the first two topics, which is testament to the depth required on the earlier topics.

The reality was that the MST wasn't extremely difficult, however, answers were completed poorly in general by the cohort, which lead to an average of about 10 out of 25 (based on tutor's remarks). It reflected poor understanding of the underlying content up to the MST, and I think was a big wakeup call for the rest of the subject; the understanding "why" is just as important, if not more, than simply understanding "how".

End-of-Semester Exam

The final exam is worth 80% of the final mark. It is 2 hours and contains 60 marks. The final exam is also a hurdle requirement for the subject.

Only one specimen exam is provided, so it is advisable to do this as late as possible, while focusing on tutorial questions, problem sheets and workshop questions first. A very important point of practice for the final exam are the proofs and derivations which may not show up in the questions and practice – it is key to understand and write-down the proofs or derivations so you're able to get some practice in for the final exam. It cannot be stressed enough the importance of understanding how concepts are derived, or where they come from. It is simply not enough to understand how to calculate things, since you'll find that they don't make up many marks on the final exam.

Good advice for the final exam is to skip questions at a whim. If at any point in the exam you find you'll struggle at a question, skip it and do the questions you can do easily which are worth many marks (i.e. high mark value questions). This may involve calculation questions or bookwork questions asking you to state assumptions, for example. You may find the exam tight on time if you dwell on key components too long.

Further practice for both this subject and ACTL30002 *Actuarial Modelling II* can be obtained from doing CT4 *Models* past exams which are available on the institute's website.

Concluding Remarks

ACTL30001 Actuarial Modelling I contain a good mixture between application and theory, and will often cross-over with ACTL30002 *Actuarial Modelling II*. Overall, it is regarded as a difficult subject, where ROTE learning is not recommended – derivations and conceptual understanding is highly required in the subject. Those who enjoyed probability and statistics last year would enjoy this subject.

It is a challenging subject, but one which is very enjoyable, as it pulls together knowledge from various subjects in the past. For aspiring actuaries and those looking to work in the life insurance sector, this subject should pique your interest.

ACTL30002 Actuarial Modelling II (1)

Exemption status	CT4 *Models*, in conjunction with ACTL30001 *Actuarial Modelling I*. Satisfactory performance in both subjects' end-of-semester exams is needed.
Lecturer(s)	Dr Xueyuan (Shane) Wu
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour tutorial
Assessments	50-minute Mid-semester exam 10% Group assignment 10% 2-hour end-of-semester exam 80%
Textbook recommendation	Workbook for Actuarial Modelling 2 (AMII), prepared by Dr Xueyuan Wu is available for purchase from the Co-op store. ✓ I highly recommend this workbook as it includes all the lecture materials, tutorial questions, progress check questions and a specimen exam.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2019 Semester 1

Subject content

- **Unit 1: Exposed-to-risk**. During the first three weeks the subject will cover the estimation of mortality from crude data. Most students found it challenging to understand the scenario of adjusting census data to match the same age definition as crude data. Practice is essential to enhance your understanding in this unit. There are hand-written illustrations for some key concepts which will be shared via the OneDrive notebook.
- **Unit 2: Hypothesis testing**. You will find it takes less effort to grasp the idea in unit 2 than unit 1 as most of the statistical tests such as chi-squared and sign tests have been taught in MAST20005 *Statistics*. This unit has more focus on the application of hypothesis tests in life insurance, which is to decide whether insurers' own internally derived mortality rates adhere sufficiently closely to the mortality rates in a published life table.
- **Unit 3: Methods of graduation**. The main purpose of graduation is to smooth the data. Although some of the graduation methods have to be fully delivered via Excel, which means they are hard to be tested in the exam, it is important to understand intuitively how each graduation technique works and be able to perform them under simple conditions.
- **Unit 4: Markov chains**. Unit 4 is not related to mortality rate modelling but properties of discrete time Markov Chains. Some of the materials have been covered in MAST20004 *Probability* while others will be discussed in greater depth. Again, being able to apply the methods such as first step analysis in various backgrounds of the questions is highly valued and especially useful in final exam.

Lectures

The attendance rate for the lectures was quite poor and Shane almost decided to turn off the recordings when it approached the end of the semester. I personally prefer to attend the lectures as it helps me to fully concentrate on the vast amount of

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

content. Having a rough pre-study before lectures and recapping what has been covered afterwards is a good way to stay on top of the subject's content.

Tutorials

While there are no marks that contribute to your final result based on your attendance, tutorials are generally useful. Full solutions will be given at the end of the week in case you miss anything in the tutorials. Similar to other subjects, tutors offered more detailed explanations regarding the thinking process and sometimes may give a different perspective which enhances your understanding.

Mid-Semester Examination

The exam consists of 4 multiple choice questions and 2 short answer questions. Students usually performed well (the average mark was 75%) if they have read through all the tutorial questions and additional exercises Shane provided. There was nothing to trip you up as long as you have followed all the materials provided.

Group Assignment

Students are allowed to form their own group of 4 for the group assignment. Unit 1-3 will be tested and you will be working with real data in Excel format. The questions about calculating central or initial ETR and conducting hypothesis tests and graduation are straightforward and standard. Be careful about the assumptions involved in each method as you may lose marks on them if they are not stated clearly.

Final Exam

The final exam was quite challenging given the short amount of time. Not only did it require you to be able to respond to each question quickly but it also tested the depth of your understanding as the questions were slightly varied from the textbook questions we were comfortable with. The revision lecture in week 12 was really helpful in terms of the key concepts likely to be covered in the final exam.

Concluding Remarks

It is difficult to cram for the exam so keeping up with the study pace will save you lots of energy during SWOTVAC. Understanding each concept intuitively and being able to apply them in different scenarios is required, so be prepared to work hard.

ACTL30002 Actuarial Modelling II (2)

Exemption status	CT4 *Models*, in conjunction with ACTL30001 *Actuarial Modelling I*. Satisfactory performance in both subjects' end-of-semester exams is needed.
Lecturer(s)	Dr Xueyuan (Shane) Wu
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour tutorial
Assessments	50-minute Mid-semester exam 10% 1000 word group assignment 10% 2-hour end-of-semester exam 80%
Textbook recommendation	The printed lecture notes for Actuarial Modelling 2 (AMII) can be purchased from the Co-op store. ✓ This is essential as all the tutorial questions, progress check questions and practice exam are located within this book.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2019 Semester 1

Comments

This subject is not very content heavy in comparison to other third-year, semester 1 Actuarial Subjects. There is a lot of overlapping content with *Actuarial Modelling I*, which focuses more on the proofs and derivations of the theory. AMII is not a subject that you can cram last minute as it requires a lot of time and effort to fully understand the content thoroughly.

Subject content

- **Unit 1:** Exposed to Risk Calculation
- **Unit 2:** Goodness of Fit Tests
- **Unit 3:** Methods of graduation
- **Unit 4:** Markov chains

Unit 1 starts off relatively easy, but the level of difficulty increases exponentially. It requires students to fully understand the theory behind the content and be able to manipulate it accordingly. This should be the most difficult section in the whole course. Students often develop their own way of calculating the solutions, and should work together to master this method of calculation. Due to the lack of practice questions, it is highly recommended for students to fully understand all the concepts of unit 1 prior to the mid-semester exam and practise it regularly. It is extremely unlikely to be able to cram this unit.

Units 2 and 3 are related to each other. Unit 2 shares similar concepts with MAST20005 *Statistics* . Unit 2 focuses on various 'goodness of fit tests', which are designed to test how well a crude data-set fits against a theoretical set of data. Students are required to know the strengths and weaknesses of each test.

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

Unit 3 covers methods of graduation. The focus of unit 3 is to take a given set of observed, crude data points and graduate them to remove any bias. Students will learn about the relationship and trade-off between data smoothness and data adherence.

Unit 4 is not related to Unit 1/2/3. It focuses on probability and Markov Chains. It focuses on a method called, "first step analysis" and students are recommended to sharpen up their matrices skills as there will be a lot of matrix calculations. Unit 4 accounts for the highest proportion of marks in the end of semester exam.

Lectures

All lectures are recorded. It is recommended to attend the lectures rather than using Lecture Capture as it allows students to ask questions, which can be quite helpful, especially in understanding Unit 1 of the course.

Shane puts in a lot of effort to break down the concepts covered in Unit 1 of the course. You are not required to follow Shane's derivations exactly in Unit 1 and it is recommended for students to derive their own method of thinking in this section. The content requires a lot of time to breakdown, understand and apply.

Tutorials

Tutorials are not compulsory for AMII, however, it is recommended for students to attend. It provides an opportunity to ask questions especially for Unit 1. Tutors will go through the tutorial questions in the textbook and provide a detailed explanation of the solution.

Group Assignment

Students are allowed to pick their own group for the group assignment. It is an Excel task where students are required to perform statistical tests on a set of graduated rates against crude rates.

It is recommended for students to cross-check with other groups prior to submitting a final group copy.

It is also recommended that assignments are completed using LaTeX.

Mid-Semester Examination

This will only cover the content from Unit 1 and 2.

Again, you should spend as much time as possible to fully understand Unit 1 content. The Unit 1 multiple choice questions can be quite different and complex. It is highly recommended for students to go through the practice exam thoroughly. For the unit 2 content which is also covered, students should remember all the goodness of fit tests and learn how to apply them prior to the exam.

Final Exam

The final exam is a 2-hour paper with 15 minutes reading time.

Students are only provided with 1 practice exam (within the textbook) therefore there is clear lack of revision material. It is advised for students to focus on the questions that they are most familiar with first, and then tackle the harder questions.

It is highly unlikely for the exam questions to be similar to questions that students have seen in the past, especially for Unit 4 and Unit 1. Unit 4 covers the most proportion of marks followed by unit 3, unit 1 and unit 2. You should also find out what formulae will be provided in the exam. For example, in the 2019 exam, the "Cubic Spline formula" was provided. Do not focus on reciting the formulae, but instead understand how they can be applied and derived.

ACTL30003 Contingencies

Exemption status	CT5 *Contingencies*, Satisfactory performance in this subject's end-of-semester exam is required.
Lecturer(s)	Dr Rui Zhou
Weekly contact hours	4 × 1-hour lectures 2 × 1-hour tutorials There are two extra 1-hour lectures in Week 1, one extra 1-hour lecture in Weeks 2 & 3 and no lectures in Weeks 11 & 12
Assessments	Group Assignment 30% 3-hour end-of-semester exam 70%
Textbook recommendation	ACTL30003 Contingencies workbook. ✓ Essential for this subject as it contains weekly tutorial problems as well as specimen examination paper. Rui also uploaded the textbook online if you're looking to save some money.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2019 Semester 2

Comments

Overall, concepts covered in Contingencies did not turn out as difficult as I first thought it would be. This subject is more so time consuming than it is mathematically challenging in comparison to other subjects in the past. Nevertheless, you are still expected to work hard (if not twice as hard, given that it is a double subject) and work consistently to keep up as it is incredibly easy to fall behind the tremendous amount of content each week.

A perfect description of this subject would be that it is a combination of ACTL10001 *Financial Mathematics 1* and ACTL30001 *Actuarial Modelling 1*. If you understood thoroughly and did well in those two subjects, you should be in a good position to excel in Contingencies.

Subject content

Life Insurance

This topic covers the first four weeks of the subject. We learn to calculate the expected values of various life insurance products including whole life insurance, endowment assurance and annuity. We then apply this knowledge to compute premiums and provisions while considering different expenses and with-profit contracts.

Joint Life

Joint life is an extension of life insurance. We now consider benefits that cover two lives instead of just one. This is the most challenging part of the subject – not only do you need to have good calculus skills but more importantly the ability to comprehend how benefit payments work under each death scenario and their corresponding probability. This topic is also the most time consuming for most students, but it is definitely worth investing some time into to get comfortable with the concept.

Multi-decrement Models

Similar to *Actuarial Modelling 1*, we look into decrements other than death and consider their dependent probability. We also learn about decrements that can only occur at some exact ages.

Pension Funds

This topic is less computational but focuses more on understanding how to derive the expression to calculate the expected present value of a pension fund, that is the amount to be set aside for a retiree to fund his/her retirement due to age, ill-health or death in service.

Demography

Demography explores the different ratios used to describe a population's birth rate and mortality experience. This is the smallest topic and was not examinable in the end-of-semester exam.

Discounted Emerging Cost Technique

DECT provides a comprehensive overview of a life insurance business broken down into unit and non-unit funds. In this section, we also learn profit testing and how to zeroise negative cash flows by setting up provisions.

Lectures

Rui goes through the lecture slides in each lecture with some additional notes. Although she occasionally makes mistakes when reproducing the results or equations from the slides, her lectures are generally easy to follow and extremely helpful in developing understanding. It is also worth noting the order of the lecture slides differ slightly from the textbook during the first four weeks, but should not pose too much of an issue if you follow the lectures consistently each week (which you should). Many students find the lecture pace to be a bit slow and prefer to watch online on 2× speed.

Tutorials

Tutorials are quite standard. At the start of the semester, Rui releases a set of questions from the textbook that will be covered in each week's tutorial classes. I would highly encourage everyone to attempt or at least think about how you would approach the questions before each class to maximise the benefit of attending. Otherwise, solutions to the questions are posted by the end of each week.

Group Assignment

The group assignment involves applying different stochastic mortality models to Australian death data and analysing the results. The task does not require knowledge from this subject, but rather you may find *Actuarial Statistics* to come in handy when modelling on R. You are then required to do a short group presentation before finally submitting your report. Given that you will have two other assignments to work on if you are also doing *MIF* and *Actuarial Statistics* concurrently, it is crucial to start early and delegate tasks effectively amongst your group members. In efforts to tackle the free-rider problem, Rui prepared two contribution forms to track and assess the amount of work done by each group member which she will then use to allocate marks accordingly.

End-of-semester exam

The end-of-semester exam is three hours long and attempts to test every part of the subject except demography. I personally found the exam to be reasonable with a few challenging questions.

Concluding Remarks

If there is one tip to success for Contingencies, it would be to work consistently throughout the semester by not only not staying on top of lectures but also attempting the tutorial questions each week. I strongly believe the concepts taught in this subject are not too difficult but would require a lot of practice in order to excel and do well in the end-of-semester exam. Best of luck!

ACTL30004 Actuarial Statistics (1)

Exemption status	CT6 *Statistical Methods*, in conjunction with ACTL40001 *Risk Theory I*. Satisfactory performance in both subjects' end-of-semester exams is needed.
Lecturer(s)	Dr Enrique Calderín
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour tutorial Occasional extra 1-hour lecture as required by Enrique.
Assessments	50-minute mid-semester exam in Week 7 10% Group assignment due in Week 12 10% 2-hour end-of-semester exam 80%
Textbook recommendation	ACTL30004 Actuarial Statistics readings, prepared by Dr Enrique Calderín. ✓ Definitely required.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2019 Semester 2

Subject content

Unit 1: Introduction to R

The first week was spent on the basics of using R for statistics. Most of the commands were familiar from MAST20005 *Statistics*.

Unit 2: Likelihood Theory

More concepts from *Statistics*, such as maximum likelihood estimation and the likelihood ratio test, were reviewed and explored in more depth. The unit also covered the Newton-Raphson method and Fisher scoring algorithms which are quite methodical and easy to understand and apply.

Unit 3: Generalised Linear Models

This was the biggest unit of the subject and required some time to understand. It was important to be able to understand the derivations and be able to use R to fit data and interpret the output. The topic also required interpretation of deviance and analysis of residuals.

Unit 4: Simulation

A very straightforward topic that showed several methods of simulation, finding the distribution of transforms of bivariate random variables and calculating the number of simulations required given a specified error tolerance.

Unit 5: Outstanding Claims Provisions

Similar to the simulation unit, there were several different methods of estimating outstanding claims provisions to learn, such as the chain ladder method, the average cost per claim method and the Bornhuetter-Ferguson method, which I found were easy to learn.

Unit 6: Experience Rating Systems

This unit was quite similar to Unit 4 of ACTL30002 *Actuarial Modelling II*, as it explored the practical uses of Markov Chain theory. The difficult part was generally in understanding the rules of an experience rating system; things like finding the transition matrix and steady-state probabilities were nothing new.

Unit 7: Time Series Analysis

I found this to be the most confusing unit as it was quite abstract. Some of the concepts, like AR and MA processes, were touched on at the end of ACTL20002 *Financial Mathematics II* but this unit explored more complex processes, such as the ARMA process.

I found that Actuarial Statistics built upon previously taught knowledge very well which made it more approachable than the average actuarial subject. Additionally, it was easy to see the real-life applications of most units and that made learning the content more interesting.

Lectures

The lecture schedule was a little confusing at first. Registration showed that there were 3 one-hour lectures every week, yet Enrique made an announcement about only having the third lecture in some weeks and the LMS had a spreadsheet that contained several previous years' lecture schedules. Long story short, there were 3 lecture theatres and times booked for the subject every week, but in most weeks, only 2 of these were used.

Lecture slides for each unit were available on the LMS before it was taught. They provided almost the same as the information in the workbook in shorter sentences or dot points and broken up into slides. Lecture slides containing the solutions to exercises and examples were available after lectures and then the complete set was available after finishing the unit.

I attended lectures in person in the first few weeks but found that Enrique's lecturing style made me sleepy and I didn't learn productively in his lectures. I figured that some of the problems in his lectures had the same impact in person and on lecture capture, so I settled for watching in my own time. However, when he used the document camera, he wouldn't notice that the paper was cut off on the projected screen until someone points it out, and he occasionally turned his back to the room and microphone when speaking, making it hard to hear.

Tutorials

Tutorial attendance was not compulsory, but tutorial solutions were only provided as physical copies in tutorials. Although I only attempted tutorial questions before my tutorial in the first few weeks, I attended all my tutorials so that I could still follow along when my tutor explained the solutions. The solutions often did not have every line of working; and it was useful to have the extra working, just in case I struggled with the question and could not understand the solution provided.

Most of my tutorials were just the tutor going through the solutions, often writing out the full working on the whiteboard. On a few occasions, he asked us to work with others on the same table to do a part of a question or individually attempt a question. I felt that my tutorials were poorly timed, and it was unclear why my tutor rushed through certain questions or spent a long time on others.

Assignments

The group assignment, worth 10%, was an analysis of one-year vehicle insurance policies. Most parts required the use of R; other work included derivation or comments on R output. The assignment was released at the start of week 9 and due

on the last day of the semester, which was sufficient time to complete it as a group. My group worked together very well and a group member who knew LaTeX wrote it up nicely, as there were marks for presentation.

Mid-semester test

The 50-minute closed-book mid-semester exam with no reading time was worth 10% of the final grade. It covered content from the first 5 weeks, including Tutorial 6. We were provided with the 2017 paper and its solutions, which were sufficient for preparation. Our exam had some parts that introduced concepts not taught in the course, but otherwise, it was quite fair. However, I received a lower mark than I expected and upon checking my paper during my tutorial, I found that marks were deducted easily for things like not checking whether a stationary point for a maximum or not asserting assumptions. I recommend doing the extra work if time permits so that your score better reflects your understanding of the content.

End-of-semester exam

The final exam was a 2-hour paper with 15 minutes of reading time and required a calculator. The workbook had a specimen paper and the 2017 final exam was provided. Solutions to both were made available on the LMS. The papers reflected the style of the actual exam and provided good guidance. The actual exam was as difficult as expected, with some questions very similar in nature to previously seen questions and others challenging students to think deeply.

Necessary Resources

The workbook, ACTL30004 Actuarial Statistics readings, was definitely required as it contained, not only the readings, but also all the tutorials and the specimen exam. The physical copy was sold at Co-op for $28, but the workbook was also available as a PDF on the LMS. As mentioned before, the readings were very similar to the information provided in the lecture slides. The subject guide also listed 4 other prescribed references:

1. Generalized Linear Models for Insurance Data by De Jong and Heller, Chapters, 2, 3 and 5.
2. Simulation by Ross Chapters 3, 4 and 5.
3. Predictive Modeling Applications in Actuarial Science. Volume I: Predictive Modeling Techniques by Frees, Derrig and Meyers. Chapters 5 and 17
4. Statistical and Probabilistic Methods in Actuarial Science by Boland. Chapters 1,2, 6 and 7.

I didn't look at these resources as there was no need for extra reading and I don't believe they would have helped much anyway.

Concluding Remarks

Actuarial Statistics was quite an enjoyable subject as it taught a reasonable amount of new ideas and presented practical applications for the content taught. The tutorials provided good practice and feedback throughout the semester, and the resources available were useful for achieving a good result.

ACTL30004 Actuarial Statistics (2)

Exemption status	CT6 *Statistical Methods*, in conjunction with ACTL40001 *Risk Theory I*. Satisfactory performance in both subjects' end-of-semester exams is needed.
Lecturer(s)	Dr Enrique Calderín
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour tutorial Addition extra 1-hour lectures in Weeks 1, 11 and 12.
Assessments	50-minute mid-semester exam in Week 7 10% Group assignment due in Week 12 10% 2-hour end-of-semester exam 80%
Textbook recommendation	ACTL30004 Actuarial Statistics workbook can be purchased from Co-op. The PDF version of the workbook (excluding the appendix containing checklists and statistical tables) are available on the LMS. All lecture notes, tutorial problems and the specimen exam are contained within this book. However, the solutions to lecture exercises are not given in the textbook and some solutions are too content heavy to copy during lecture. I personally found printing the lecture slides (with solutions) more convenient.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2019 Semester 2

Comments

This subject is one of the more applicable and useful subjects in the Actuarial major. The technical skills in R and the statistical modelling skills are transferable to areas outside of actuarial work, such as data analytics and even economics and finance.

Subject content

Unit 1: Introduction to R (3 lectures)

This unit gives you a revision of lab content learned in MAST20005 *Statistics* and goes into depth in MLE functions. Knowledge in this unit will be frequently used in the assignment but not in the final exam.

Unit 2: Likelihood Theory (5 lectures)

The first half of unit 2 is generally taught in *Statistics*, however, some of the derivations are examinable so you do need to pay attention to them (ask Enrique which one is examinable, and he will answer you). The Fisher-Scoring algorithm is one of the most calculation tedious parts of this subject and it will be used a lot in R to find estimates. In terms of the likelihood ratio test, I always get confused about the test statistics. Whether it is the smaller model minus the bigger model or the other way around, you need to take some time to get used to it. Both the likelihood ratio test and Fisher-Scoring will be revisited in the last week of unit 3.

Unit 3: Generalised Linear Models (6 lectures)

Unit 3 starts with a revision to linear models used for the normal distribution. The generalised linear model is an extension of linear regression learned in *Statistics*. This is very useful as any distribution in the exponential family, such as Poisson and Negative Binomial distributions, can also be used for regression. The application of R will also be introduced in this unit for model selection criteria, likelihood ratio test, parameter estimation and Fisher-Scoring. As a result, the assignment will help you to truly understand this unit.

Unit 4: Simulation (4 lectures)

The Inverse Transformation Method and finding the required number of simulations were covered in *Statistics*, so this was not a content-heavy unit. The Acceptance-Rejection Method requires deep understanding in terms of the process and the proof of some properties. Box-Muller and Marsaglia's polar methods of simulation introduce how to find independent random variates from standard normal distributions.

Unit 5: Outstanding Claims Provisions (2.5 lectures)

Content includes Run-off triangles, Basic Chain Ladder Method, Average Cost per Claim method, Bornhütter-Ferguson Method and variations incorporating inflation and incurred costs. This is a topic that is widely used in practice and I've heard people having interview questions on this topic. In terms of learning it, not much understanding was required for this topic. You just need to remember the process and follow them. The calculation can be very tedious here.

Unit 6: Experience Rating Systems (1.5 lectures)

This unit is again a revision of previous content. Everything was introduced in *Actuarial Modelling 2*. The content in the lectures was very simple but the tutorials were relatively harder, introducing a loss model that was not covered. Enrique will remind you during lectures that the exam questions will be harder than the lecture, so the tutorial questions and the specimen questions for this topic will be more useful.

Unit 7: Time Series Analysis (5 lectures)

Unfortunately, the most confusing part of the subject was placed in the last two weeks. Although some of the content was introduced in *Models for Insurance and Finance*, there were still some topics that required a lot of time to understand. However, the questions given in tutorials and specimen were not too harsh. Most of the questions are quite routine. I spent a lot of time on stationarity, causality, invertibility, covariance function, and forecasting, as I felt they were the most likely to be examined (and they were).

The forecasting part given in the lecture was very general, the derivation was long and tedious making it unnecessarily hard to understand. I personally found narrowing it down to a specific forecasting problem – for example, forecasting 1 period ahead with 2 lags – and following the general steps given would make it a lot easier to understand. I found the lecture exercises for this unit much harder than the tutorial questions. Try to understand every lecture example before the final exam.

Lectures

I personally found Enrique a very good lecturer, although it took me a long time to get used to his accent. He explains and gives extra notes on areas that are confusing and quickly go through areas that are straightforward. Going to his consultations was absolutely enjoyable too.

I did not go to lectures in person as I'm more productive with recordings, but I do recommend lecture attendance for this subject. Sometimes the desk microphone doesn't pick up everything Enrique says especially when he walks around.

Tutorials

The teaching styles vary a lot by tutors as usual. Tutorial solutions will not be uploaded on LMS and a printed solution was handed in class, so attendance is recommended. The tutorial questions are very well designed for a deep understanding of the content taught. They do fully prepare you for the final exam. I highly recommend you understand every question given.

Group Assignment

The assignment gives you a deeper understanding in unit 3 and unit 4 which will help in the final exam. The amount of R involved in this assignment will help you master R while doing it. It is a group assignment, but I do recommend you try the questions as much as possible individually because you will learn a lot from it. With that said, I also recommend you start the assignment as soon as it is released. Even though you get 3 weeks to do it, which is a long time, you also have to do it with the other two Actuarial assignments while catching up on lectures and doing some revisions if time allows. I definitely suggest going to consultations regarding the assignment, since Enrique is very happy to guide you through the problems you have.

Mid-semester test

You get a feel of how Enrique styles his questions in the mid-semester test. It was a lengthy paper for mid-semester test and lots of preparation was required. Some parts of the tutorial during the week of the mid-semester test were also examinable which were not clearly pointed. I did not attend the tutorial nor the lecture during the week of the test (I didn't know they were examinable), but luckily, I was still able to guess the answer right because it was an extension of the previous week. Hence, being up to date will help a lot with the test.

The good thing about Enrique's exams is he often gives intermediate results, coupled with "show that"-type questions. Therefore, it is easy to check results, and you can use the intermediate results given to do the next question. Not being able to do the first question does not mean that you can't do the next one.

End-of-semester exam

We were given a specimen exam and a 2017 past paper. Enrique specifies during the lectures that the specimen exam goes beyond the scope so only understanding solutions were required. The 2017 paper was very similar to the final exam. We even got one question that was exactly the same. Again, the tutorial questions are very good preparation materials, and together with the lecture exercises, past papers, and the assignment will make you master the exam.

Concluding Remarks

Overall, Actuarial Statistics was one of the more enjoyable subjects in level 3. It is a content-heavy but practical subject. The resources and assessments help you a lot with deep understanding and application to real life and Enrique is an experienced and supportive lecturer who is very patient and willing to offer help. While was an enjoyable process to learn, the content required a significant level of effort and practice to truly understand the intuition and derivations behind formulae. I hope you enjoy this subject as much as I did, good luck!

ACTL30005 Models for Insurance and Finance

Exemption status	Not an exemption subject but is a prerequisite for ACTL40004 *Advanced Financial Mathematics I* (CT8 *Financial Economics* exemption subject)
Lecturer(s)	Dr Ping Chen A/Prof Shuanming Li
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour tutorial
Assessments	50-minute mid-semester test due in Week 7 10% Group Assignment due in Week 12 10% 2-hour end-of-semester exam 80%
Textbook recommendation	None, all lecture notes, summaries, tutorial questions and problem sets will be uploaded to LMS.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2019 Semester 2

Comments

I personally found the subject quite enjoyable (not relatable to most of my peers though) and it was the easiest subject to prepare for among all three core ACTL subjects. This may be because I like theoretical mathematics and learning through analysis and understanding without much memorisation. Ping delivered the lectures really clearly; she was good at leading us through the thinking processes and explaining the intuition behind some abstract concepts. Shuanming's lectures were at a faster pace and were relatively harder to follow, due to his plain tone of voice. However, I found all that he said made sense when I was highly concentrated.

To do well in this subject, my general advice is to go through all learning materials including tutorials, problem set questions and additional notes delivered in the lectures. The summary notes provided for each chapter are also really helpful to test your overall understanding.

Subject content

Chapter 1: Advanced Probability — Week 1 – Week 7

Chapter 1 is the building block for chapters 2 and 3. It starts by reviewing basic concepts in Probability such as the definition of events, sets and partition. Later on, a new and important concept - Sigma-algebra is introduced. The chapter also provides a general definition for the expectation of simple random variables and it can be applied to measure elements that are not expressible as numbers.

Overall, quite a few concepts in chapter 1 are abstract and challenging to understand initially, but with enough practice, you will eventually handle them.

Chapter 2: Discrete Stochastic Processes and Martingales — Week 8 – Week 9

This topic is slightly more interesting and relatable to applications in real life, such as gambling strategy. A discrete stochastic process is a collection of random variables for a discrete-time period. The martingale specifically is a spe-

cial stochastic process when the conditional expected value of the next event is the same as the outcome of the current event.

The most difficult concept for me of this chapter was the Optional Stopping theorems. We were not only required to understand the theorems themselves but also apply them to solve different scenarios. My suggestion is to redo the tutorial questions at least twice so you fully understand the way to approach them. Additional notes in LMS for 'How to generate a martingale' are also helpful.

Chapter 3: Continuous-time stochastic processes, Brownian motion, Ito's Integrals, Ito's formulae and Stochastic differential equations –Week 10 – Week 12

Chapter 3 focuses on a special case of continuous time stochastic process - Brownian motion and its properties. The proof for some basic properties of Brownian motion are examinable and can be proved easily by hand. Although it is not required to memorise nor derive Ito's formulae – as they are given in the information sheet at the final exam – knowledge of how to apply these formulae are definitely required. We seemed to run out of time before finishing off all content in week 12 so Shuanming didn't dive very deep into the topic of stochastic differential equations (SDE) and we were not expected to solve but only recognize SDE.

This chapter introduced quite a few new topics and it took time for me to learn to apply Ito's formulae. Fortunately, the questions regarding this chapter were pretty standard and they were easy marks to earn once you have had enough practice.

Lectures

Ping taught the lectures for the first six weeks, whilst Shuanming was responsible for the rest. I highly recommend previewing the lecture material before attending them as the content can be quite abstract; it would be difficult to keep up with the pace without knowing what would be covered beforehand. After finishing each chapter summary notes of the topics taught are posted on LMS. These summaries are served as extra learning material and I found greatly consolidated my knowledge. I personally found the content of the lectures quite helpful to enhance my understanding of the lecture notes. I preferred attending lectures in person to avoid distractions and motivate me to be fully concentrated.

Tutorials

All tutorial questions were uploaded on LMS at the beginning of the semester and we were expected to finish each week's questions prior to each tutorial. The tutorial is easy to follow as long as you go through these questions beforehand. Normally, tutorials start by reviewing content from the previous week and proceed by running through the solutions for each question in detail. Solutions will be released at the end of each week. The tutorials are worth going to since tutors explain the thinking process behind the solution and the tutors were very helpful when answering questions during or after classes.

Assignments

The mid-semester test is designed to build up students' confidence for the rest of the semester, so it was relatively easy. Although the lecturers would point out which proofs are not examinable, some were tested; so make sure you read all of the example questions and additional notes demonstrated in the lectures. The post-lecture summary notes were also quite useful in terms of interpreting some abstract concepts learned and gave me a well-rounded idea of what we were expected to know.

Mid-semester test

The assignment consisted of ten questions and covers the content of the whole semester. Half of the content covered by the assignment was learned by the time the assignment was released in week 7. I recommend starting it early as the other core ACTL subjects will also have assignments lining up and are usually all due at week 12 and the MIF assignment took our group less time to complete compared to the ACTL30004 *Actuarial Statistics* and ACTL30003 *Contingencies* assignments. The assignment was relatively straight forward; some of the questions appeared in either the tutorials or lecture notes, and there were also a few tricky points that were cleared through group discussion or online research. However, there was one question that covered the content of the last lecture, so you might need to self-study the last week's lecture material ahead of time to finish the assignment earlier.

End-of-semester exam

The MIF final exam was in the first week of the exam period and, as Shuanming was aware that we might not have enough time to review all the content, he pointed out the important tutorials and problem set questions that we should focus on. This saved me a significant amount of time. Although there was no past exam paper, we were given a specimen exam paper whose structure and difficulty was quite similar to the real exam paper. The exam questions were fair, and it is possible to achieve a good mark if all the study material is reviewed thoroughly.

Concluding Remarks

The pace of the subject accelerated throughout the semester, especially so approaching the final week. The contents for every lecture will definitely take some time to digest and fully understand, so I would recommend keeping up with the subject pace consistently throughout the semester and undergoing regular revision.

ACTL30006 Financial Mathematics III

Exemption status	CT8 *Financial Economics*, in conjunction with ACTL40004 *Advanced Financial Mathematics I*. Satisfactory performances in the end-of-semester exam of this subject, and in the mid-semester test and end-of-semester exam of ACTL40004 *Advanced Financial Mathematics I* are required.
Lecturer(s)	Dr Zhuo Jin
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour tutorial
Assessments	Mid semester exam in Week 7 — 10% Individual assignment, due in Week 7 — 10% 2-hour end-of-semester exam (hurdle requirement) — 80%
Textbook recommendation	Joshi, M. S., & Paterson, J. M. (2013). *Introduction to Mathematical Portfolio Theory*. Cambridge, UK: Cambridge University Press. ✓ Essential for this subject, as all tutorial questions are set from this textbook. However, I would look around for a soft copy if you're cost conscious.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2019 Semester 1

Comments

Financial Mathematics III (FM3) explores the role of an actuary working in the fields of investments and asset management. Some topics including the Capital Asset Pricing Model (CAPM) and the Arbitrage Pricing Theory (APT) may seem familiar from previous subjects such as FNCE10002 *Principles of Finance* and ACTL20002 *Financial Mathematics II*. However, FM3 not only provides more detail but also introduces a range of new topics surrounding portfolio theory. Overall, this subject is quite content-heavy and formula-based, therefore it is ideal that you work consistently throughout the semester to keep up.

Subject Content

- Mean-variance analysis: Assuming investors only care about mean and variance of returns, we learn to construct an efficient portfolio consisting of different assets that will allow them to achieve ideal returns while minimising risks. Knowledge of linear algebra, specifically Gaussian elimination, is applicable here when computing the weights of assets in the portfolio via the covariance matrix. We also use single or multi-factor models when calculating the expected return, variance and covariance of each individual asset. The Gram-Schmidt algorithm is used to remove correlation between indexes to allow for less tedious computations.
- Utility theory: In this section, we explore investors' risk preferences by their utility function to determine their investment behaviour. Types of utility include exponential utility, power utility and log utility. This topic also looks at first order and second order stochastic dominance as well as geometric means.
- Capital Asset Pricing Model (CAPM): One of the most popular equations in finance which computes the return of

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an asset considering its exposure and correlation to the market. Two-factor CAPM is introduced where the risk-free rate in the original CAPM equation is replaced by the expected return of a zero-beta portfolio.

- Arbitrage Pricing Theory (APT): A slight throwback to *FM2* from the previous semester, we learn to calculate the expected return on a general portfolio using the principle of no arbitrage.
- Market efficiency and rationality: Short topic classifying market efficiency as strong, semi-strong and weak. It is not possible to make money by exploiting mispricings as stocks are accurately priced by the market taking into account risk adjustments.
- Risk measures: The concept Value-at-Risk (VaR) is introduced as the how much or more can be lost with a given probability. You will also learn to calculate shortfall probability and expected shortfall.
- Stock price models across time: The lognormal distribution from *FM2* is revisited here when calculating the mean, variance and VaR. Time series models, both the ARCH and GARCH processes as well as the Wilkie model are touched upon.

Lectures

Zhuo goes through the subject content strictly adhering to the lecture slides and explains the topics very well with the aid of his additional notes which he writes throughout the course of each lecture. As lecture recordings fully capture what he writes, viewing lectures online provides a similar experience to attending lectures in person. With that said, being such a content heavy subject, it is worth stressing the importance of not falling behind and going through the concepts by the end of each week to consolidate them. Personally, I chose to attend the lectures not only because I found it easier to focus and engage in class but also due to convenience as it was the first of three back-to-back-to-back sessions that I had (followed by *AMII* lecture and *AMI* workshop).

Tutorials

Tutorial questions are set from the prescribed textbook. Solutions are provided at the end of the textbook which serve as decent checks after you have completed your tutorial work.

My tutor would start each tutorial with a recap of the formulas we learned the previous week before going through each question together as a group. Although attendance is not compulsory, I still attended all my tutorials not only to fully test my understanding of the topics but also to check that the textbook solutions were accurate as they can sometimes be slightly flawed or difficult to comprehend.

Assignment

The individual assignment was completed on Excel and makes up 10% of the final score for the subject. The task involved building a model which computes the weights of assets, expected return as well as the standard deviation of the portfolio given different risk-free rates, individual asset returns and covariance matrix. The assignment was fairly easy and with enough checks you should be able to get full marks.

Mid-Semester Exam

The mid-semester test was one hour long and makes up 10% of the final score of the subject. It covers the first four weeks of content such as finding the tangent and minimal variance portfolio, their expected return and variance as well as the factor models. The test was extremely straightforward and similar to the practice test provided. Completing the assignment

and practice test should prepare you well enough to do the test. As always, speed and accuracy are key to excel in any mid-semester exam and this one is no exception!

End-of-Semester Exam

The final exam is worth 80% of the final score for the subject. Before the exam, we were provided a specimen exam that was simple and easy to do. However, the difficulty of the actual exam turned out to be drastically higher and as a result, caught a lot of students by surprise. The exam consisted of a single definition question with the remaining ones being calculation based that were not only tedious but required a deeper understanding of the content to complete. Personally, I found the exam to be a huge step up in terms of rigour in comparison to tutorial questions that we worked on throughout the semester. Therefore, make sure you are comfortable doing variations of questions under each topic.

Concluding Remarks

Personally, I found the topics and theories covered in this subject intriguing. It was unique in the sense it gave insights about the work behind asset management rather than insurance that we were more familiar with. If you aspire to be an investment actuary or fund manager, you will definitely enjoy this subject.

Honours Subjects

Contents

ACTL40002 Risk Theory I

Exemption status	CT6 *Statistical Methods*, in conjunction with ACTL30004 *Actuarial Statistics*. Satisfactory performance across both subjects is needed.
Lecturer(s)	Dr Xueyuan (Shane) Wu
Weekly contact hours	3 × 1-hour lectures
Assessments	1-hour mid-semester exam in Week 7 20% Individual assignment, due Week 12 10% 2-hour end-of-semester exam 70%
Textbook recommendation	Dickson, D. C. M. (2005). *Insurance Risk and Ruin*. Cambridge, UK: Cambridge University Press. ✗ Not necessary to purchase. A few questions in problem sheets will be from this text but there are so few it will be more worthwhile to use the copies in the library. This book will be used in Risk Theory II but again, it will probably be cheaper to go to the library.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2018 Semester 1

Comments

Risk Theory I provides an introduction to a number of models to estimate claim amounts for insurers and reinsurers. With this, it will introduce various probability distributions, classes of distributions and calculation methods to aid the use of these models.

This subject was one of the most enjoyable personally for the semester and possibly out of all ACTL subjects. An understanding of concepts such as the various distributions, conditioning and moments, MGFs and PGFs taught in MAST20004 *Probability* in addition to MLE, Bayesian Estimation from MAST20005 *Statistics* will be very useful.

Although not computationally and conceptually difficult, a large part of this subject will involve being able to apply the methods used in the many proofs within the subject. Indeed, it is less important to memorise every step of a proof but much more important to be able to understand the techniques being used in each step, as exam questions will rarely ask you to straight up regurgitate a result seen in the slides but rather prove a similar result but with a small variation. Furthermore, to do well in the subject it is important you are familiar with the formula sheet and also know some of the tricks that can be used to solve some otherwise very lengthy expectation calculations.

Subject Content

The subject is well structured and split into 5 sections

1. **Distributions in Non-life Insurance** — This section begins as revision for some basic results of some important distributions within the subject. Most techniques will be familiar from prior studies, however there are some new and simple results that are important to know, such as the CDF of a gamma distribution for integer shape (α) parameter. 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

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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. **The 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. Remembering results for the Compound Poisson will be useful. 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 how important it is to understand the techniques being used in the proofs, in particular, for Panjer's Recursion. At first it will definitely seem daunting as the proof will almost be a page in length. However, many of the proofs will use similar techniques to it so it is important you understand it. Furthermore, it may be useful to understand how to find the probability of x claim amount by first principles as occasionally it may be faster/easier than using recursion. For example, having 0 aggregate claim amount is the same as having 0 claims or having x claims and each being 0 in value. 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. De Pril's Recursion was incredibly lengthy, but the techniques within it are definitely still examinable. Finally, some estimation techniques using Compound Poisson caps out this section. This chapter I found to be the least interesting and thankfully it was quite short.

4. **Introduction to Ruin Theory** — Ruin theory in our context is saying that if an insurer's capital follows a certain process, how long will it take for us go bankrupt. In this subject, only a brief introduction is made for this concept and much more detail will be involved in RT2. The main concept that is taught is finding upper bounds for this ruin probability. I found this section quite interesting.

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 be quickly apparent 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 will seem a bit all over the place but once you get a grasp of the bigger picture and the meaning of each formula, it is apparent they are more intuitive than possibly first thought. For EBCT1, it is not too bad as many results are similar to sample variance, sample mean etc. However for EBCT2, the relaxing of certain assumptions make this model more complex. Shane was nice to recognise this as well and reassured us that any exam questions would give us the relevant formula for these questions. It is also important you know the different assumptions between Bayesian, EBCT1 and EBCT2.

Lectures & Tutorials

As this is an honours/masters level subject, this subject involves 3 lectures a week. There are 6 'tutorials' throughout the semester which take the place of a lecture where Shane will go through questions on the tutorial sheet. I believe the course was previously taught by Professor Dickson and the clarity of the lecture slides are evident.

I was impressed by Shane's teaching style for this subject. He was quite clear and taught at a good speed. For many proofs and questions, Shane would write handwritten notes for how he would do it and I found these to be very useful. These would then be uploaded onto a OneNote file which he shared at the start of the semester and would be accessible whenever one pleases. It was clear the work and dedication he had put into teaching this subject and I am immensely thankful for it. Shane would also often respond very quickly to any emails sent to him.

Finally, doing and understanding all questions on problem sheets and tutorial sheets will be crucial to your success in this subject. Tutorial sheets are probably the best practice for the exam.

Assignment

The assignment was given in week 10 and due in week 12. It was relatively straightforward but nonetheless, care still needed to be taken. In the feedback given to us, it was clear having a well written report is crucial. It is important you are clear and concise with how you came to results and indeed what the actual result is! Students got marked down for saying things like 'refer to R code'. Finally, there are a couple of marks reserved for presentation; these should be easy marks so please be neat. Handwritten, typed in Word or LaTeX are all fine.

Mid Semester Exam

The MST was held 2 weeks after the break (mostly because Easter was quite early in 2018). You had one hour. We were given 2 practice papers beforehand to practice as well. The MST had 2 questions and was accessible to students. There was one particular question that required a proof that proved to be trickier. The formula sheet is provided. Unlike in undergraduate subjects, the MST also counts towards exemption.

Final Exam

The exam is 2 hours, with 15 minutes reading time. The exam in 2018 was a good standard. It was well written, with a good range/length of questions and with sufficient revision, should all be doable. One practice paper was given. This practice paper was quite frankly very very difficult and worried me for the exam itself. Fortunately, the actual exam was much fairer. Again, the formula sheet is provided.

Closing Remarks

I found this subject very interesting and well taught. It applies concepts learnt in introductory probability and statistics subjects from earlier years to an insurance context. Shane taught the subject with clarity and dedication. Lectures were well organised and the plentiful amount of practice questions greatly aided learning. This was a subject I very much enjoyed.

ACTL40004 Advanced Financial Mathematics I

Exemption status	CT8 *Financial Economics*, in conjunction with ACTL30006 *Financial Mathematics III*. Satisfactory performance in the mid-semester test and end-of-semester exam of this subject and satisfactory performance in the end-of-semester exam of ACTL30006 *Financial Mathematics III* are required.
Lecturer(s)	Dr Zhuo Jin
Weekly contact hours	3 × 1-hour lectures
Assessments	Individual assignment, due around Week 8 10% 1-hour mid-semester test in Week 8 20% 2-hour 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. ✗ It is not necessary.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2018 Semester 1

Comments

This subject is one of the most difficult subjects in the degree. There will be a lot of confusion and frustration. Many results will need to be taken as fact without proof as they are far beyond scope. However, in all the conceptual difficulty, there are several results that are quite remarkable in the way they are used to price various contracts.

Subject Content

The subject is quite lengthy with the course being over 550 slides. This is to be expected as from any of the FM subjects.

Introduction/Binomial Trees — The first couple weeks act as an important background. It begins with revision of previously seen topics like the payoffs for Puts/Calls as well as Put Call Parity which is one of the most important results in the subject. Later on, binomial trees will be introduced, which is effectively a simplified world where stocks can only move 2 states per step.

Martingales/Brownian Motion/SDE — This section acts as an introduction for stochastic processes and their differential equations. Most techniques will be familiar from ACTL30005 *Models for Insurance and Finance*. Fortunately, they will all be reviewed as not all students in the cohort will have taken MIF. The definition of a martingale, the definition and properties of Brownian motion will be important knowledge. Finally, solving SDEs and associated techniques such as Ito's Formula, integration by parts, product rule, integrating factors will all be introduced in the SDE context. I found the integrating factors slides to be a bit unclear. Indeed, the technique is effectively the same as with ODEs. Additionally, the result of Ito's Isometry is very important for later proofs in the subject. All the techniques taught in this section of the course will be incredibly crucial for later on.

Black Scholes and the Greeks —I'm sure many of you will have heard of the famed Black Scholes equation, this will most likely be the first time you will go into much depth about it. These chapters begin with proving the result through

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hedging and martingale approaches. It is important you understand how these proofs work as well as the assumptions of the BS model. Later on, criticisms of the BS Model will be discussed. Then the Greeks are introduced which are just the derivatives (in the calculus sense) of derivative values. These give us an indication of how the value of a product changes according to various factors. Finally, the BS model is modified to allow stocks with dividends and how these can be related to foreign exchange. I found the forex content in the course to be extremely confusing.

Interest Rate Derivatives — Rather than depending on stocks, some derivatives depend on future interest rates. The main difference between this is that you cannot actively trade interest rates like you do with stocks. Furthermore, interest rates exist for a range of maturities rather than one stock price. Some products like forward rate agreements, swaps, caps and floors are introduced as well as the Black Formula. This is a very important formula for the subject. However, it is a bit unclear in the slide exactly what it is as it is introduced in the context of pricing a cap but can be used in a variety of contexts. Later, numerous exotic interest rate derivatives are introduced. I found this section to be both frustrating and uninteresting. It is effectively a long list of products which come exam time would just surmount to meaningless rote learning to be forgotten right after. I hope this section will either be removed or made non-examinable in future iterations of the course. Finally, a number of term structure models are introduced to model the instantaneous short rate as well as simulating future interest rates with them and how they can be applied to a binomial tree.

Credit Derivatives — The final chapter is covered in the very final week and covers credit default swaps and credit risk concepts. This includes the recovery rate if a company bankrupts as well as how firm values are modelled. An understanding of the Merton Model is crucial and thankfully Zhuo provided a summary of it at the end of week 12 as the slides are quite bare.

Lectures & Tutorials

Each week there are 3 lectures. There were few if any tutorial sessions, however Zhuo would often cover some difficult questions at the end of the final lecture each week. Lectures were generally at a good pace and Zhuo tries his best to explain quite difficult concepts in the best way possible. However, many concepts will make little sense the first time. This is mainly due to the abstract nature rather than his lecturing style. Personally, I also found the lecture slides a bit convoluted at times. In the tutorial aspect of the course, Zhuo will also type up summaries of more complex or important areas which I found really useful. Each week's lecture slides also include a series of practice questions increasing in difficulty. I found many of these very challenging at first try, however, as the course progressed, later concepts could be applied to questions from earlier making them easier to understand.

For some reason, lecture capture quality was quite poor at times with the picture extremely washed out. This made some of the things he wrote on the slides extremely difficult to read and I had to resort to bothering my friends to clarify what was written. Additionally, the audio would at times peak, making the recording literally painful to listen to. Zhuo also writes on the board especially when he is doing a recap of topics. As someone who on many occasions was unable to attend lectures in person, it was incredibly triggering to listen to him writing on the board and having no idea what was there. I hope for future cohorts Zhuo will write on the back of slides/loose paper under the document camera as writing on the board hinders learning of the concepts for no good reason.

Assignment

The assignment involved pricing various vanilla and barrier options using binomial trees. What made this trickier was the fact that the number of steps would be variable. As such, VBA macros were allowed to be used in the calculation. Doing some online research on how to write VBA code will be important if you're unfamiliar with it. Zhuo allowed some other programming languages if you consult with him beforehand.

Mid Semester Exam

The mid semester exam was a fair standard, was accessible and also tested concepts well. It covered everything up to the Black Scholes derivation. There were no practice papers. It is important you do the questions at the end of each week's slides as these are a good indication of the standard of questions.

The average in our cohort was 13.5. Zhuo provides a breakdown of every questions' average which was useful to see which were harder/easier. The MST also counts towards exemption.

Exam

The exam was good length. There were a number of trickier questions as well as simpler ones that had come virtually straight from previous papers. As such, it is very important you attempt both practice papers and have a firm understanding of all questions in them as the actual exam will be of a similar standard.

Overall, the exam is quite challenging but still fair. Compared to the CT8 exams from the Actuaries Institute however, they are vastly more difficult. All 7 questions were worth 10 marks even though some were vastly more time consuming than others. The exam will have a couple questions on theory such as explaining assumptions or what a certain derivative is. To do well in exams it is also crucial to understand the extra explanatory sheets that Zhuo will go through in lectures to explain more difficult questions. Exam questions will often draw from these – especially the one given in week 12.

Closing Remarks

This subject was very challenging. The amount of content is not as immense but the fact that some concepts get very abstract make this subject conceptually very difficult. For such a conceptually difficult course, Zhuo generally lectured well but I sincerely hope he makes some simple changes to vastly improve the quality of lecture recordings for future years.

ACTL40006 Actuarial Practice and Control I

Exemption status	Part IIA *The Actuarial Control Cycle* and Part IIB *Investment and Asset Modelling*, in conjunction with ACTL40007 *Actuarial Practice and Control II* and ACTL40009 *Actuarial Practice and Control III*. Satisfactory performance in all three subjects' end-of-semester exams will lead to exemption from both Part IIA and Part IIB.
Lecturer(s)	Mr David Heath — Subject coordinator; General Insurance Mr Andrew Brown — Life Insurance Mr Donald Campbell — Superannuation Mr Richard Cooney — Investments
Weekly contact hours	2 × 2-hour lectures
Assessments	Group assignment, due in Week 10 — 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 not essential.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2018 Semester 1

Comments

This subject is more qualitative than many of the actuarial subjects you would have taken previously, and hence requires a different skillset. In particular, the ability to judge what is relevant and material to a problem, and then be able to succinctly communicate that, is what differentiates the better students.

However, it can also be quite hard to judge your grasp of the material and how well you are actually performing throughout the semester. The best way would probably be to discuss the content and work through the example problems with other classmates. That way, you can compare your approach and way of thinking with theirs, and identify any areas that you're missing or need improvement on.

Subject Content

The subject content is taught following 9 aims:

1. Actuarial Control Cycle;
2. Professionalism;
3. Environment;
4. Regulation;
5. Product features and risks;
6. Enterprise Risk Management;
7. Risk assessment frameworks;
8. Product design;

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9. Models *(may or may not be examinable, depending on time constraints)*.

More specific aims such as those relating to environmental context, products and risks are taught in-depth from the General Insurance, Life Insurance, Superannuation and Investment perspectives. The majority of the content follows the first three perspectives, with 2 lectures having an Investments focus.

In addition to what is taught in lectures, you're also expected to have background knowledge and understanding of the four industries. To help give you a starting point, documents containing knowledge 'fundamentals' are provided on the LMS at the start of semester.

Lectures

The lecturers are working actuaries with experience in their respective fields, hence they are knowledgeable in both the subject content and the way to approach problems in a real-world setting. In particular, they impart a lot of context to the subject material via their personal experiences and anecdotes, which can be quite interesting to listen to even if it's not always the most relevant.

The lecturers take turns, and often continue off from their previous lecture, so I'd recommend you to look over the previous lecture they took before each class.

Student participation in lectures is expected, with class time given for discussions on lecture content or even relevant events occurring in real-life, e.g. the royal commission. Participation was decent throughout the semester, and it's a good way to test if you're really understanding the material. (Note that the lecture recordings generally don't pick up student voices.)

A couple of the lectures were tutorials, and most of the lectures in the last 3 weeks were revision, which gives you an opportunity to work through some exam-style questions. However, the first tutorial was only in Week 4, so there may be an extended period of time where you feel like you're learning things but still not sure how the subject actually works.

Assignment

For the group assignment, we acted as consultants to a client, where the final objective was to deliver a report that provides solutions to the client's problem. The assignment had 3 components with successive due dates: an initial scope letter, a draft report, and the final report.

The assignment was designed to imitate the stages of an actual work project. Writing the scope letter ensures you're taking the report in the right direction, however it mainly involves paraphrasing the assignment questions. On the other hand, the feedback given after the draft report is very useful, and should definitely be incorporated into the final report.

One aspect that groups tended to struggle with was the page limit, hence it was important to identify the essential aspects of the problem to elaborate on, and keep other sections brief. In particular, groups should examine the situation from the client's point of view, and consider their objectives, what risks they may be exposed to etc. and hence recommend a suitable solution.

Overall, the assignment could be easily completed within the given time frames, as long as your group was efficient at dividing up tasks and staying on track.

End-of-Semester Exam

The exam is open-book, so you don't need to memorise definitions, legislations etc., which is quite useful. Of course, a good understanding of the content and how to approach questions is still essential. Industry background knowledge is particularly important, as there are questions involving areas that are not always covered in depth in lectures.

A specimen exam was provided, which is very helpful to go through. The actual exam questions followed a similar level of difficulty and structure. Most of the questions on the exam were challenging, but not unfairly so. I personally found that the investments question was worded rather confusingly, however that may have been because we didn't have many examples to go off.

In addition to worded answer questions, the exam also includes multiple choice questions, where you choose all, some or none of the options for each question. Hence, there feels like an element of chance regarding whether or not you get the mark for the question (e.g. choosing 2 of the 3 right options still gives you no marks).

Although 3 hours sounds like a long time, it was definitely necessary and packed with writing.

Concluding Remarks

Overall, APCI is quite an interesting subject as it finally provides some context towards all the maths you've been learning. You gain much more of an idea of the types of situations and problems that actuaries actually encounter and solve in the workplace.

ACTL40007 Actuarial Practice and Control II

Exemption status	Part IIA *The Actuarial Control Cycle* and Part IIB *Investment and Asset Modelling*, in conjunction with ACTL40006 *Actuarial Practice and Control I* and ACTL40009 *Actuarial Practice and Control III*. Satisfactory performance in all three subjects' end-of-semester exams will lead to exemption from both Part IIA and Part IIB.
Lecturer(s)	Mr David Heath — Subject coordinator; General Insurance 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 10 — 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 not essential.
Lecture capture	Full (audio and visual).
Year and semester reviewed	2018 Semester 2

Comments

Actuarial Practice and Control II is the continuation of the previous course, APCI. APC forms a bridge between the specific technical skills taught in Part I subjects and their applications in a business and commercial context. Therefore, judgement and experience play an important role in decision-making. However, APCII is still the most technical one among all APC subjects.

Subject content

Aim 9 – Model: Select an appropriate model to solve client problems. Part of this has been mentioned in APC I, however, more details are provided here.

Aim 10 — Capital: Recognise the importance of capital, which is defined as the "excess of assets over liabilities". We mainly discuss the purpose of capital, how capital is acquired and how different levels of capital affect different stakeholders.

Aim 11 — Liabilities: Apply relevant approaches and techniques to the valuation of liabilities. There are a lot of uncertainties facing insurance companies, and it could be very complicated in terms of estimating the value of liabilities – it's basically an "uncertain measurement of an uncertain process". Therefore, the valuation of liabilities and how the ultimate figure is determined needs to be based on economic and financial assumptions, which will be covered in much detail.

Aim 12 — Pricing: Apply relevant techniques to the pricing of products and contracts. How much should an insurance company charge for insurance coverage? What risks can arise? Does the premium take all these risks into account?

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

Aim 13 — Solvency: Measure, report and manage solvency. Insolvency is always a risk for insurance companies; the issue arising if they cannot pay the obligations as they fall due. It remains a big task for insurance companies to seek to stay profitable and solvent.

Aim 14 — Profit: Measure and report emerging profits and/or costs. Accounting principle indicates that revenue is only recognised when services are conducted. In terms of insurance companies, the premium is paid in advance, and with each policy different from another, it's critical that the organisation takes the uncertain nature of liabilities into consideration.

Aim 15 — Monitoring & Aim 16 — Managing: Monitor and assess experience; Manage the business and respond to the experience. These two aims make the control cycle a real "cycle". It's important that an actuary monitors the impact of the decision, as either favourable or unfavourable outcomes may be generated; and the actuary needs to respond to these outcomes quickly and properly.

In the midst of this, two lectures about health insurance are covered, focusing mainly on Community Rating, Risk Equalisation and Demutualisation.

It should be noted that knowledge from APCI may still be examinable for APCII exam as they are highly correlated. Therefore, it's highly recommended that you are familiar with concepts in APCI and bring your APCI notes in the exam as well.

Lectures

Lectures are held at 5:15pm on Tuesdays and Thursdays (and I don't see this changing in the future). All lectures are delivered by actuaries who work in a wide range of businesses- therefore, the content is up-to date. APCII lecturers are very distinct in style and characteristics, therefore, their lectures are very enjoyable, even though they are scheduled after-hours. David Heath incorporates current events into his lectures; Andrew Brown covers much about the prospect of the actuarial profession; Donald Campbell delivers many of his own past experiences in superannuation industry and Andrew Gale, the guest lecturer, covers Health Insurance, with interactive games designed to inspire students to create the most profitable model. Lecturers would bring up questions to maintain good communication between students and lecturers, and students are encouraged to ask questions as well. It's a course that's definitely worth staying back till 7 for.

Assignments

The assignment works in a very similar way to the assignment in APCI, where a draft report, then a final report needs to be submitted. You can always make changes to your report after receiving feedback on the draft report. You will be assigned into a group by the coordinator. APCII assignment does require some technical skills, as it requires you to perform a valuation of the long service leave liabilities.

Again, the assignment is not considered for Part II exemptions, but it will affect your subject score at the end of the semester.

End-of-semester exam

This is an open-book exam — you can bring all your annotated lecture slides, the textbook, and your own summary notes. The exam has 15 minutes reading time followed by 3 hours of writing.

Even though APCII is a qualitative subject, it is recommended that you write in dot points. It is also very critical that you answer the questions with clear and concise responses for all questions. This will make sure that you won't be in a rush, which many students found themselves in. Exam questions will provide you with some background information and the question itself in 1–2 paragraphs. Overall understanding of all the issues learned in the semester is required to be expressed effectively in the exam. Also, remember to put everything in your bound reference.

Tips for success

APCII is a qualitative subject, and it is recommended to be done in a group, with regular discussion of lecture content and other content. It is the most effective way to study this course. Through group discussion, you can all strengthen your understanding even if you don't have a firm understanding of the content. It is also important to incorporate the knowledge from APCI – they are not isolated courses, but related. Think about the interconnection between the Aims (across both APCI and APCII), because the Control Cycle is a whole, organic unit rather than isolated units. In order to better facilitate the knowledge, it is recommended that you form a "map", to locate the items you've learned. Ask a lot of questions, you will be well received.

Best luck for your study.

ACTL40009 Actuarial Practice and Control III [SM2]

Exemption status	Part IIA *The Actuarial Control Cycle* and Part IIB *Investment and Asset Modelling*, in conjunction with ACTL40006 *Actuarial Practice and Control I* and ACTL40007 *Actuarial Practice and Control II*. Satisfactory performance in all three subjects' end-of-semester exams will lead to exemption from both Part IIA and Part IIB.
Lecturer(s)	Dr Kevin Fergusson
Contact hours	1 × 1-hour workshop 1 × 2-hour lecture discussion
Assessments	Individual Assignment due in Week 11 20% 3-hour end-of-semester exam 80%
Textbook recommendation	Investment Bridging Course Notes, Actuarial Practice and Control III Student Course Notes, Actuarial Practice and Control III Course Texts and Abstracts All texts are provided digitally on the LMS. Course notes are available for purchase at the Co-op if you prefer. ✗ Not absolutely necessary but clarifies concepts in lectures.
Lecture capture	N/A
Year and semester reviewed	2018 Semester 2

Comments

ACTL40009 Actuarial Practice and Control III (APC3) introduces investment theory, an important part of the actuarial repertoire. Although not exactly apparent how it is the case at the beginning of the course, the crux of the subject involves you taking the perspective of a senior actuary making decisions regarding very long-term asset allocations. This may be from the perspective of pension fund, short- and long-tailed insurance company, DB fund or a government looking to provide for welfare. For someone like me who previously had little knowledge about investments, it provided a fascinating and structured consideration of the various asset classes and the investment environment.

Subject content

The subject goes into significantly more depth into investment thought than what you may have encountered in Financial Maths subjects in your Bachelor's degrees or the Investments lectures in *Actuarial Practice and Control I*. It delves into the main asset classes of equities, property/REITs and debt as well as derivatives like futures options. For the assets, we analyse how returns can be estimated in the long run. This time frame is crucial to our analysis and decision making as from the perspective of the corporate investors, they are not day traders hoping to make a quick profit from market fluctuations. After considering the various asset classes, the course is supplemented with views regarding investment theory such as the efficient market hypothesis, bubbles, speculation, legal and tax implications and the effects of inflation. As I'm sure you know, investments often behave in unpredictable ways; in this regard, there are also some rather philosophical elements in the subject such as how hypotheses are tested in an investment model, what it means to be risky and whether observations are laws or regularities.

This subject is about understanding the principles behind investments. Mathematical aspects will be few and far between and those that do appear could all be done on a single line calculator or even in your head. For example, rather than

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calculating time and money weighted rates of return with a formula, an estimation will suffice. Some concepts from FM2 will reappear such as FRNs, Macaulay Duration and Immunisation but with a different approach. Rather than calculating the exact price for a bond, questions will be more theoretical such as what happens to the price of an FRN when the interest rate increases by 1%.

After considering the various asset classes, the techniques to long-term return estimation and the investment environment, the final 2 weeks of the subject tie it all together. You will consider various corporate investors and consider their needs, objectives, time frames and recommend an asset allocation.

Lectures

Dr Fergusson delivers lectures in a clear and enthusiastic manner and encourages participation in class. In the early weeks, he will attempt to learn each of your names which I thought was a nice gesture. However, I did not attend any lectures in person throughout the semester. I did not find this to be a hinderance as the lecture recordings were clear and Dr Fergusson would always finish on time. However, to do this, he will occasionally rush through latter parts of lectures to finish on time. Most lectures began with a true/false section that was used as a gauge to see if we had completed the readings. Many of these were excerpts directly taken from the required readings. Following this, lectures would go into the content. I think too much time would be spent on the True/False section of slides so hopefully this is improved in the later years. It is crucial that you look through lectures after class in your own time as I found it difficult to understand many concepts first time around, especially those towards the end of classes which were rushed through.

Workshops

Workshops are a crucial part of the subject. The workshop questions are provided weekly with some additional questions and solutions provided afterwards. The entire workshop session would be recorded. I did not attend any workshops, nor did I watch them afterwards . As such, I cannot really comment on the quality of the workshops. I would highly highly **highly** advise against this. I did however make an attempt at the questions in my own time. It will be immediately apparent the questions will be extremely difficult the first time as they often seen farfetched and on occasion, seemingly unrelated to the lecture content. I cannot emphasise how critical understanding the questions are come exam time so persevering and attempting to understand the solutions provided will be rewarded generously.

Optional mid-semester test

Dr Fergusson provides an "optional MST" during the middle of semester that you can attempt in your own time and hand in for him to mark. Many of the questions will seem quite difficult as they involve concepts taught later on in the semester so don't feel disheartened if you have absolutely no idea. I didn't attempt the optional MST at the time but did look over at the end of the semester for exam revision which I would recommend.

Exam

The exam is 3 hours with 15 minutes of reading time. However, the main difference to other APC subjects is that the exam is closed book! Dr Fergusson understands many students' desire to achieve exemption and he will try his best to ensure all students will do so. I would highly recommend for revision to thoroughly go through all workshop questions, the specimen exam and the optional MST as they are very close representations of the actual exam. Please note the specimen exam is a bit shorter as I believe our exam was 100 marks while the specimen was 80. The actual exam was an acceptable length compared to other actuarial subjects, but I did have to rush a few questions to complete them all, so effectively managing your time will be important. Also, it is important to realise that many questions could have multiple solutions such as for asset allocations and your estimates of returns. As such, clearly communicating your assumptions, rates and justifying

your choices are as, if not more, crucial than your actual result. Finally, Dr Fergusson will provide an 'Aide Memoire' with current market rates such as of inflation, bond yields for various timeframes, cap rates and long-term estimates for returns. It is crucial you remember these going into the exam as it will not be provided. I found this mindless memorisation of these rates frustrating, but it has to be done.

Summary

Overall, I found the subject interesting but very challenging. Dr Fergusson is organised and runs the subject well. Material is uploaded each week without delay. I would highly recommend understanding the worksheet problems that you encounter and attending workshops. As with all the other Part II subjects, you will have realised that there is more judgement and no definitive answer; this is all in preparation for Part III studies and this subject provides a good building block in that regard. Although a difficult subject, with clear communication of your results and focussed revision on the aspects mentioned previously, it is definitely possible to earn exemption/a good mark.

ACTL40010 / ACTL40011 Actuarial Studies Projects [AYR]

Exemption status	None.	
Lecturer(s)	Dr Xueyuan (Shane) Wu Dr Zhuo Jin A/Professor Shuanming Li	
Weekly contact hours	3 × 1-hour workshops each project	
Assessments	3,000 word assignment due end of week 8, Semester 1 3,500 word assignment due end of week 4, Semester 2 4,000 word assignment due end of week 12, Semester 2	25% 35% 10%
Textbook recommendation	None.	
Lecture capture	None.	
Year and semester reviewed	2018 All Year	

Subject content

ACTL40010 /ACTL40011 Actuarial Studies Projects is an introduction to the world of research. As such, it is completely different to any actuarial subject you would have taken. It consists of 3 large projects that are given throughout the year. There is no exam. You have the choice between this subject or doing the year- long thesis in Actuarial Studies Research Essay to complete the requirements for the Honours degree. Masters students can choose to take this subject as well. I believe all Honours students this year completed Projects (the cohort was less than 10 people). Of course, the choice is entirely up to you and depends on your future aspirations. The faculty will recommend you do the thesis if you wish to pursue a PhD.

Project 1

The first project was delivered by Shane. It was an investigation into modelling the capital of an insurance company using the Compound Poisson process. In addition to this, we modelled claims as well as the effects of tax. We were interested in considering how long it would take for a company to either go bankrupt or reach a level of capital that was too high, as organisations also don't want to hold too much capital. For this project I utilised R to do the simulations and involved concepts taught in ACTL40002 *Risk Theory I* (RT1).

Project 2

Zhuo led this project. It involved an analysis of 10 stocks from the US stock exchange and, using single and multifactor models, we performed mean variance analysis. This involved drawing out efficient frontiers and finding asset allocations with and without restrictions on trading/short-selling. I used both R and Excel/VBA. The majority of the concepts in this project were taught in ACTL30006 *Financial Mathematics III* (FM3) and some from ACTL40004 *Advanced Financial Mathematics I*.

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Project 3

The final project was organised by Shuanming. This project required us to model claims using the collective risk model. The number and amount of each claim was modelled based on empirical data provided to us. We were required to use estimation techniques on a number of distributions we previously had not seen such as applying Beta transforms to distributions. We were then required to perform tests to see which fit best and then finally calculate risk measures such as Value at Risk. This project was definitely the most time-consuming and was also worth the most marks. I enjoyed the fact it combined concepts from many areas within the degree such as from MAST20004 *Probability*, MAST20005 *Statistics*, FM3 and RT1.

General advice

It will be extremely useful to have an understanding of a programming language. It is up to you which to use but some popular ones are `R`, `VBA` and `MATLAB`. All submissions required you to submit your code as well. The projects are often based on research topics that the academics in the faculty may have recently worked on and will involve an extension to concepts learnt all throughout your previous studies. The lecturers will recommend that you do broader research to get the higher marks. This will require you to look into research done in the broader actuarial/financial maths community. Google Scholar will be extremely helpful for this. The university has a subscription available through the library website which I would recommend you use.

The ultimate advice I would be able to give is to plan your time well. The projects can be quite lengthy and cramming them all into the final week will lead to extreme stress and neglecting your other subjects. I would recommend you set goals for the progress you wish to make each week, while taking into account assignments and MSTs for other subjects. The only reason why you may not do well in this subject is poor planning. The concepts are ones that you would have faced many times in your degree and since you've gotten this far, all the projects are more than doable.

The lecturers all prefer the use of LaTeX and I would also recommend that you provide what the audience desires. Fortunately, this year, Shane provided us the LaTeX file he had used to write up the task sheet so even if you've never used LaTeX before, it is possible to make slight modifications to this to write your entire project. On multiple occasions this semester, the academics also encouraged you to take initiative beyond the tasks explicitly asked of you. The outstanding marks will go to the students who go above and beyond.

Another basic aspect that is often overlooked is to thoroughly proofread your submission. It is a simple thing to do and may earn you a few marks.

Finally, each academic will hold 3 sessions scattered evenly throughout the period of each project (9 in total over the year). I would highly recommend attending the first one as this is where the details of the project are first discussed and you will be able to gain some valuable insight to what each lecturer expects and some hints as well. Later sessions were often sparsely attended and were only really useful if you had pressing questions. Of course, there was no real need to wait for these as all the academics would respond to emails.

Summary

I found all the projects quite interesting and enjoyable to work on. It was a good break from the coursework subjects. The overarching skills that this subject requires of you are the best representations for your working career (although thankfully you won't be using LaTeX or needing to research academic papers at work). The subject brought together concepts that were taught earlier in your degree and seeing them applied in a new context was a perfect bookend to the actuarial major and made it apparent just how far you've come in the past 4 years.

Masters Subjects

Contents

ACTL90001 Mathematics of Finance I

Exemption status	CT1 *Financial Mathematics*. Satisfactory performance in the mid-semester test and end-of-semester exam of this subject 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

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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 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.

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	CT8 *Financial Economics*, in conjunction with ACTL90003 *Mathematics of Finance III*. Satisfactory performance in the end-of-semester exam of this subject and satisfactory performance in the mid-semester test and end-of-semester exam of ACTL90003 *Mathematics of Finance III* are 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

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

- 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 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.

ACTL90005 Life Contingencies

Exemption status	CT5 *Contingencies*. Satisfactory performance in this subject's mid-semester and end-of-semester exam is needed.
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 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.

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

- 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.
- 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.

Concluding remarks

Overall, I really enjoyed this subject, especially the maths involved and the challenge of deriving variations on established formulae.

ACTL90006 Life Insurance Models I

Exemption status	CT4 *Models*, in conjunction with ACTL90007 Life Insurance Models 2. Satisfactory performance in both subjects' end-of-semester exams is needed.
Lecturer(s)	Professor 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. ✗ 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.

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

- The Poisson Process — This section is very proof heavy and focuses on different theorems associated with the 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	CT4 *Models*, in conjunction with ACTL90006 *Life Insurance Models I*. Satisfactory performance in both subjects' mid-semester and end-of-semester exams is needed.
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.

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

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.

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.

ACTL90008 Statistical Techniques in Insurance

Exemption status	CT6 *Statistical Methods*, in conjunction with ACTL90004 *Risk Theory I*. Satisfactory performance in this subject's end-of-semester exam and a satisfactory final grade in ACTL90004 *Risk Theory I* are required.
Lecturer(s)	Dr Enrique Calderin
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 review was previously published in the 2018 end-of-year edition of the *Actuarial Students' Society Subject Review*.

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

Unit 6: Experience Rating Systems

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.

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.

ACTL90011 Actuarial Practice and Control II

Exemption status	Part IIA *The Actuarial Control Cycle* and Part IIB *Investment and Asset Modelling*, in conjunction with ACTL90010 *Actuarial Practice and Control I* and ACTL90009 *Actuarial Practice and Control III*. Satisfactory performance in all three subjects' end-of-semester exams will lead to exemption from both Part IIA and Part IIB.
Lecturer(s)	Mr David Heath — Subject coordinator; General Insurance Mr Andrew Brown — Life Insurance Mr Donald Campbell — Superannuation Mr Andrew Gale — Health Insurance
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 not essential.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2017 Semester 2

Comments

ACTL90011 Actuarial Practice and Control II continues on from where APC1 left off. APC focuses more on the qualitative side of being an Actuary, where judgment and context is absolutely key to a wide range of decisions that must be made. APC2 is ever so slightly more technical than its sibling.

Subject content

APC1 and APC2 both cover 16 aims laid out by the Actuaries Institute. APC1 covers the first 9 aims, and APC2 covers the rest. The remaining aims are:

Aim 10 — Capital: defined as the "excess of assets over liabilities" (at least in an insurance context). The purpose of capital, how capital is acquired and how different levels of capital affect different stakeholders is discussed.

Aim 11 — Liabilities: insurance companies are in the business of uncertainty, and valuing liabilities is not always the most straightforward thing; it is an "uncertain measurement of an uncertain process". The economic assumptions and financial assumptions that are incorporated into liability valuation, and how they affect the ultimate figure are discussed in great detail.

Aim 12 — Pricing: how much should an insurance company charge for insurance coverage? What risks can arise? Does the premium take into account all of these risks?

Aim 13 — Solvency: an insurance company is always at risk of becoming insolvent (i.e. unable to pay their obligations as they fall due). How can an insurance company help maximise the probability of remaining solvent?

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

Aim 14 — Profit: not much is covered for this aim. The matching principle from accounting says that revenue should only be recognised as services are performed. In the context of an insurance company, where premiums are paid in advance, this is very important, especially considering the uncertain nature of the liabilities that are paid out for each policy.

Aim 15 — Monitoring & Aim 16 — Managing: the final two aims are what makes the control cycle a "cycle". After a decision is made, the impact of that decision must be monitored so that the actuary can respond to any favourable and unfavourable outcomes in a timely and appropriate manner.

In the midst of this, a couple of lectures about Health Insurance are covered, focusing mainly on Community Rating (i.e. everyone is charged the same premium regardless of individual characteristics), Risk Equalisation and Demutualisation.

You will want to retain as much knowledge from APC1 as possible (I sincerely hope this was obvious to you).

Lectures

Much like its sibling, lectures are held late afternoon on Tuesdays and Thursdays (and I don't see this changing in the future). 2017's cohort was (un)lucky enough to have Tuesday lectures start at 5:15pm instead of the usual 4:15pm. I hope for your sake you don't have to go through the same thing (though apparently it's better for the lecturers).

Lectures were very engaging, as they were delivered by current working actuaries in a wide range of industries. Each lecturer from APC1 (apart from the Investments lecturer) returns with their distinct style which made attending lectures enjoyable despite the incredibly late timing — David Heath would often bring up recent events affecting General Insurers, Andrew Brown would often talk about the future of the actuarial profession, and Donald Campbell would often bring up amusing stories from his time as a superannuation actuary. Andrew Gale was the "guest lecturer" of the semester, taking two lectures focusing on Health Insurance, with the majority of the second lecture being an interactive Health Fund game, where groups competed to create the most profit across several rounds.

Very often, lecturers would ask questions to keep us on our toes, and students were encouraged to ask questions throughout the lecture. However, the microphone did not do a very good job at picking up what students say, and while the lecturers tried their best to remember to repeat what students say, they often wouldnt. For this reason I would recommend attending lectures, even if it means staying back at university until 7 at night; grab a coffee and do whatever you need to do to stay awake.

Assignment

Much like in APC1, the assignment placed you in the shoes of an actuarial consulting firm, and required you to do some "client work". A draft report and a final report was to be submitted; there was no scope letter that needed to be submitted (which was the case in APC1).

In APC2, the assignment was more technical in nature, requiring groups to perform a valuation. Just over a week after the draft report was submitted, feedback was provided for you to incorporate into your final report.

The assignment is not considered for Part II exemptions, so don't stress too much about it and take it more as a learning experience. The assignment will only determine your subject score at the end of the semester.

End-of-Semester Exam

Luckily, this is an open-book exam — you can bring anything that is not prohibited (...David's words, not mine). You can bring all your annotated lecture slides, the textbook, your own bound reference, and even a magazine to read if you finish early (a joke from David).

The exam had 15 minutes reading time followed by 3 hours of writing. Despite being a qualitative subject, you were encouraged to write in dot points. Clear and concise responses are essential to making sure you answer all the questions, as many students found themselves rushed for time.

Exam questions would usually provide a paragraph or two, providing some context before asking a question. Questions ranged from "Explain the concept of ...", "What should be considered for ...", and "What impact will this have on ...". Evidently, a holistic view on all of the issues discussed throughout semester is required to perform successfully in this subject.

Each of the lecturers would stress the intent of why things are done, and if you understand these intentions and are able to explain it clearly and concisely, the exam should come naturally to you. Alternatively you can chuck everything into a 100 page bound reference and use that in the exam.

Tips for Success

Forming study groups is the most effective way to study for the APC trio. Being a qualitative subject, discussion is very important, and talking through lecture content, even if no one really has a firm understanding of the content, will ultimately benefit everyone involved.

Retaining as much knowledge from APC1 is essential — don't treat the two subjects as isolated cases. Think about how each Aim links to each other (across both APC1 and APC2), as ultimately the Control Cycle should be thought of as a whole unit rather than a collection of disjoint sub-units. For example, when coming up with a premium for insurance products, you should consider the regulations that govern your line of business, and what your competitors are doing (plus a myriad of other things); focusing solely on making a profit will not always work out. Mindmaps are invaluable here.

Also don't be afraid to answer some of the questions in lectures.

ACTL90009 Actuarial Practice and Control III [SM1]

Exemption status	Part IIA *The Actuarial Control Cycle* and Part IIB *Investment and Asset Modelling*, in conjunction with ACTL90010 *Actuarial Practice and Control I* and ACTL90011 *Actuarial Practice and Control II*. Satisfactory performance in all three subjects' end-of-semester exams will lead to exemption from both Part IIA and Part IIB.
Lecturer(s)	Dr Kevin Fergusson
Contact hours	1 × 2-hour lecture 1 × 1-hour workshop
Assessments	Individual Assignment due in Week 11 20% 3-hour end-of-semester exam 80%
Textbook recommendation	Investment Bridging Course Notes Course Texts and Extracts Student Course Notes The Course Texts and Extracts and the Student Course Notes are provided on the LMS, and were made available at Co-op roughly 3 to 4 weeks into the semester. ✓ I recommend them.
Lecture capture	Full (both audio and video). Caters for both university and distance education students.
Year and semester reviewed	2018 Semester 1

Comments

Actuarial Practice and Control III (APC3), as it is currently delivered, is unlike any subject delivered by the actuarial department. In your previous finance subjects, you took the assumptions and methods used in various models (such as the CAPM) as a fact. This is the subject where we question those very models.

Now, where does this all fit in with the actuarial profession? Unfortunately, it isn't very clear at all until the last 2 weeks of semester.

Subject Content

APC3 takes a higher level view of financial markets, focusing more on how financial markets work rather than coming up with a single number for the return of an asset.

This subject is perhaps the only subject in the course with **critical thinking** as a key focus. For example, you may have learnt that a stock has a higher return than a bond because is *riskier* (e.g. Mean-Variance Analysis). However, the issue goes a lot deeper than that; what do we mean when we talk about the riskiness of an asset? In *Financial Mathematics III*, we use risk to refer to the volatility of the return. But we shouldn't we also consider counter-party risk, liquidity risk, or many of the other types of risk that come with purchasing an asset? Why is it that a riskier asset produces a higher (average) return? Is it purely because of investor behaviour, or is there some other factor that remains unidentified?

With that introductory example out of the way, let's move onto the course structure. The first week opens by setting the overall mood of the subject. The expectation for students to be able to analyse and discuss different ideas critically is

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

displayed before showing a brief justification of the use of history to inform our decisions. Afterwards, two key ideas in the actuarial profession are brought up and questioned:

1. share prices will keep pace with inflation; and
2. total return from investing in shares will exceed the total return from investing in bonds by a material margin.

Following this is 7 weeks of discussing different types of assets. Weeks 2 and 4 deal with fundamental analysis, a technique used to place a value on a company's shares through careful scrutiny of publicly available information (e.g. company reports, announcements, financial news). At the end of week 4 there is a discussion on the impact of inflation on company reports, and how inflation may distort a company's financial position as displayed through their balance sheet. Sandwiched in the middle of these two weeks is a discussion on speculative bubbles; are they able to be detected before they burst, and what are the characteristics of a speculative bubble?

Week 5 deals with debt markets, and how debt securities work, along with a discussion on immunisation and the yield curve, which you may remember from ACTL20002 *Financial Mathematics II*. Week 6 discusses the property asset class; in particular, the characteristics and issues with direct property investment. Following this is a discussion on securitisation (essentially the formation of a trust which invests in some type of underlying asset, with units issued to potential unitholders.).

Any income you earn as an investor will be taxed. Week 7 deals with taxation from the point of view of an institution, with a focus on superannuation companies in pension and accumulation mode, and insurance companies. Here, topics such as franking credits may be familiar territory from *Business Finance* (but not in *Principles of Finance*), while other topics such as the Double Tax Treaty (i.e. how tax is handled on foreign income) may be completely new to you. Week 8 deals with derivatives, their characteristics and the risks they introduce, despite being assets with the purpose of mitigating risk.

Week 9 discusses the rationale behind splitting assets into asset classes, before discussing which asset classes would be best to keep up with (hyper-)inflation. Week 10 revisits the efficient market hypothesis, CAPM and the equity risk premium, which you may remember from *Financial Mathematics III*.

So why are we learning about all this as aspiring actuaries? Typically, the companies we end up working for will need to hold some combination of assets to support the liabilities that are held, whether they are pension payments for pension funds or claim payments for insurance companies. How do we estimate the return of our asset portfolio? Coming up with this return will require a strong understanding of how the underlying assets work, as ultimately, actuaries should be able to justify any of the assumptions they have made. That is what the remaining weeks of the semester deals with. How we should allocate our assets to meet different goals and estimating the long-term return of our asset mix are discussed here.

Overall, the content of the subject is incredibly interesting, and the focus on critical thinking is a huge plus. However, throughout the semester, the looming question of "why am I learning this?" was very prevalent, and unfortunately it wasn't until the last 2 weeks where everything made sense. I guess the key takeaway here is throughout the semester, have the following at the back of your mind:

As an actuary, I need to know about this so I can justify assumptions for investment returns.

Lectures

The 2-hour lecture is split into two halves, each half dealing with a different (sub-)topic. Slides are uploaded the weekend before the lecture starts, leaving you plenty time to print them out before the lecture starts.

Kevin is incredibly knowledgeable in the finance industry, and was incredibly receptive to feedback throughout the semester. However, it was not very easy to pick up on the things taught in lectures, which I think was a combination of both the difficulty

in learning things about the finance market without actively taking part in it and the way lectures were delivered. It might be worth forming study groups with other students to discuss content in depth after the lecture is over.

Workshops

These are essentially a 1-hour lecture focused more on answering questions rather than teaching subject content. Questions for the workshop were released at around the same time as the lecture slides.

These questions are essential to help consolidate your understanding of the subject. Try your best to attempt them before the workshop to train your thinking. The questions are very open-ended, and the solutions may appear to be a bit wishy-washy, but this reflects how work is in the real world – things are ambiguous and uncertain all the time.

Solutions are discussed in the workshop, as well as uploaded to the LMS as the week ends.

Optional Mid-semester Exam

An optional mid-semester exam was also made available in the middle of the semester. Scripts were expected to be done in 2 hours of your own time, but obviously there was no way for this to be verified. Scripts were to be handed to the lecturer roughly a week after the mid-semester paper was made available. This gave you the opportunity to get your answers marked and valuable feedback to be provided. However, most of the feedback was minimal, mainly consisting of ticks or crosses. Moreover, the paper was a compilation of some of the workshop and lecture exercises, for which solutions were provided, meaning that if you kept up with the subject content, it didn't force you to apply knowledge into new situations.

Based on the mark I got and the marks everyone else got, people did extremely well for the optional paper, which may have instilled a false sense of confidence in us for the subject. More on this in the **End-of-Semester Exam** section.

Individual Assignment

The assignment was an individual assignment due in week 11 of the semester. We had about 6 weeks to finish it. The submissions were to include a written report and the Excel spreadsheet used for calculations.

The assignment put us in the shoes of an actuary who was asked to provide a buy/sell/hold recommendation on a portfolio of 15 different stocks. To do so, fundamental analysis had to be applied, which required the analysis of company reports for each of the 15 different companies.

As tedious as the assignment was, I personally thought it was the most well-constructed assignment in the course, forcing students to deal with data limitations and some of the ambiguity that is present in the real world. Not only that, it helped me learn about fundamental analysis through the actual act of performing it rather than reading about it. However, it is a very challenging and time-consuming assignment, so your mileage may vary. From what I could tell, most students did incredibly well, with marks ranging from 18 to 20 out of 20. We were not given any feedback on our assignment however.

End-of-Semester Exam

Much like the other APC subjects, the exam was 3-hours, and examined everything in the course. However, unlike the other APC subjects it was closed-book. Students were expected to have a decent idea of some of the more pertinent rates in the market, such as the cash rate, the 10-year bond rate, the cap rate, etc. Kevin was kind enough to provide a summary sheet that showed what these rates were in October 2017, but it may be worth looking up the rates yourself to get the most up-to-date rates.

A specimen exam was provided, which was a compilation of some of the exercises from workshops and lectures (as well as the questions that were on the optional mid-semester paper). The style of the actual exam was very similar to the specimen.

In terms of study preparation, make sure you have a good understanding of the workshop solutions; in particular, how they justify certain statements, as you will be expected to justify any assumptions you make in the final exam.

I suspect that the end-of-semester exam was marked much harsher than the practice mid-semester exam and the assignment. Hence, don't be lulled into a false sense of security if you score well in either of those two.

Concluding Remarks

Overall, APC3 was an interesting experience. Though the subject content was extremely interesting, its purpose was incredibly unclear until the final 2 weeks of the semester, which is unfortunately a shame. Forming study groups, and consistent discussion will be the key to success in this subject. Best of luck in what is likely your final exemption subject for accreditation.

ACTL90014 Insurance Risk Models II

Exemption status N/A; this subject does not constitute any exemption requirement but is instead an elective upon satisfactory completion of ACTL90004 *Insurance Risk Models* (which comprises part of the exemption requirement for CT6 *Statistical Methods*).

Lecturer(s) Dr Enrique Calderin

Contact hours 3 × 1-hour lectures

Assessments

	Honours	Masters
Mid-Semester Exam (Week 8)	20%	20%
Individual Assignment due in Week 12	—	10%
2-hour Final Exam	80%	70%

Textbook recommendation Dickson, D. C. M. (2005). *Insurance Risk and Ruin*. Cambridge, UK: Cambridge University Press.

The textbook is not essential. However, the textbook is extremely good at explaining some of the more complex concepts should you refer to it throughout the semester.

Lecture capture None

Year and semester reviewed 2017 Semester 2

Comments

Between the two optional postgraduate Actuarial subjects, this is far and away the more popular choice, as conceptually *Risk Theory* is a lot easier to digest than the crazy martingale stuff of *Financial Mathematics*. That does not mean this subject is easy by any means — welcome to what is likely to be the last numerical actuarial subject of your long arduous journey.

Subject content

The precursor to this subject (ACTL90004 *Insurance Risk Models*) deals with models for a general insurance company, taking into account the random nature of both the claim size and the claim numbers. Rather than modelling the claims paid by an insurance company, the majority of 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:

Unit 1 — Utility Theory makes its return from ACTL30006 *Financial Mathematics III*. In a nutshell, Utility Theory assumes that entities make decisions based on a function of the amount of wealth they will have (you can think of it as some sort of "satisfaction level"). Calculations on the minimum and/or maximum premium amount that should be charged for a given risk and utility function are the focus of this unit.

Unit 2 — Premium Principles — Utility theory is just one way to calculate an appropriate premium for a given risk. Additionally, you have already dealt with calculating a *Fair Premium* (from ACTL30003 *Contingencies*). This unit explores a wide range of methods to calculate premiums, taking into account various features of the distribution of the risk (e.g. its variance, or distribution function).

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

Unit 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. This is arguably the hardest part of the course.

Unit 4 — Ruin Theory — in my opinion the most interesting part of the subject. 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. Lundberg's inequality for the probability of ruin (which you may remember from IRM) is derived, as well as finding analytic solutions for the ruin probability (assuming certain distributions) using various calculus techniques, and deriving approximations to the ruin probability.

Despite being a "sequel" to IRM, I didn't feel like there was much connection between the two subjects. From memory, the only bit of overlap was ruin theory and knowing how to calculate the moments of a compound distribution.

Lectures

Much like in IRM, slides are released in units with the exception of Unit 4, which was released on a rolling basis. However, the style of slides were very different (not that it affected much).

Enrique would go through each slide, filling in any blank space with proofs and examples as they appeared. Being Enrique's first time, sometimes the proofs were a bit hard to follow or had errors which students were quick to point out. However, I imagine most of these would be rectified in the next iteration of the subject.

Occasionally, a tutorial would be held in place of a lecture in which Enrique would work through a problem. Tutorial sheets would often contain up to 10 questions. However, only around 4 or 5 were covered in the lecture, with the remaining questions left as an exercise for the student.

Mid-Semester Exam

As is standard in Actuarial subjects, a mid-semester exam is held in Week 7. Plenty of past mid-semester papers were provided as practice. In 2017, due to timing issues, the only units that were examinable were Units 1 and 2, though parts of Unit 3 were examinable in the past.

Questions on the paper ranged from theoretical questions ("Give the mathematical definition of ...") to computational questions ("Calculate the premium under such and such principle") and even proof questions ("Prove that ABC satisfies XYZ").

Nothing in the mid-semester exam was too difficult to answer, considering the strong set of mathematical tools that the undergraduate course should have equipped you with. In fact, all you really needed were skills in probability and integration. Much like in every integration question, your biggest downfall will be silly mistakes (or missing a minus sign... whoops :S). Answers had to be extremely thorough to get full marks, with the highest mark being 37.5/40.

Assignment

The assignment is only given to Masters students, presumably to give Honours students a bit more time to spend on their research project/essay.

Questions on the assignment primarily related to Unit 3, with one (unassessed) question on Unit 4. It was a very long assignment, with 8 lengthy questions. None of the questions were too difficult, though the use of numerical approximation techniques were required.

Many students did not keep up with the subject, and the assignment did an extremely good job at forcing them to finish studying the course by the time SWOTVAC came around.

End-of-Semester Exam

Enrique was kind enough to provide 3 past exams. You will quickly notice that these exams each have a fairly common style and format. The 2017 paper had a very similar style, but the difficulty of the questions was much harder. Solutions were not provided for these papers — deal with that however you need to (e.g. forming study groups or doing research).

Much like all actuarial exams, questions focused more on conceptual understanding than grinding out the correct method for specific questions. For example, while the majority of questions about utility theory throughout the semester will be in an insurance context, a question on the exam asked about one in a gambling context instead.

There were 7 questions on the end-of-semester exam, with more of a focus on Units 3 and 4. Many of the questions were quite accessible. Questions ranged from "Calculate how much an individual would be willing to pay to make a decision under utility theory", "Prove that a reinsurance arrangement is optimal" and "Explain intuitively what this mathematical expression means". One of the trickier questions involved proving an inequality was true for all values of a parameter M.

Tips for Success

IRM2 will not be as conceptually challenging as many of the subjects you will have taken in the past (e.g. the *Financial Mathematics* pentalogy is conceptually much harder), so many of your mistakes will be silly mistakes.

You will want to brush up on your proof skills if you want to excel in this subject. The questions that differentiate between those that do okay and those that do amazing are likely to be the ones that require you to prove something. There is usually a long way and a short way of answering all of the proof questions — it should be obvious which one you will want to use in an exam setting.

While there might appear to be a lot of tedious memorisation that is required, taking a step back from the slides and just thinking about what the big idea is will really reduce the burden of memorisation. For example, one of the approximations to the ruin probability involves solving a system of linear equations for which an ugly analytic solution is provided. In essence, you are really just approximating a random variable using a zero-inflated gamma distribution and matching moments.

Honestly, if you have made it this far into your degree, it should not be too hard to do decently well in this subject — you should focus more on your exemption subjects *Actuarial Practice and Control II* (and *III* if you are an Honours student). Best of luck!

ACTL90018 General Insurance Practice

Exemption status	N/A; this subject does not constitute any exemption requirement but is intended to prepare students for their Part 3A and Part 3B exams.
Lecturer(s)	David Heath Lynda Young 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

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

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, 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.

ECON90015 Managerial Economics [SM2]

Exemption status	CT7 *Business Economics*, in conjunction with ECON90032 *Macroeconomics for Managers* and *ECON90047Macroeconomics 2*. An average of 73 across all three subjects are required, with no fails.
Lecturer(s)	Dr Ivan Balbuzanov Dr Jonathan Thong
Weekly contact hours	1 × 2-hour lecture 1 × 1-hour tutorial
Assessments	Online multiple-choice test in Week 6 10% Individual Essay due in Week 10 20% 2-hour end-of-semester exam 70%
Textbook recommendation	None
Lecture capture	Full (both audio and video)
Year and semester reviewed	2019 Semester 2

Comments

I really enjoyed Managerial Economics. The content was interesting, and my lecturer was engaging. All of the lecture slides were comprehensive and neatly presented, and the tutorials were well structured and helped enhance my learning in the subject.

Subject content

Weeks 1–5

The first part of the semester was an introduction into the market and key concepts in microeconomics such as supply and demand. We looked at factors that affect supply and demand, shifts in the curves, the elasticities of supply and demand and the concept of economic surplus.

Weeks 6–9

These lectures put together everything taught in Weeks 1 to 5 and looked at the different types of markets that exist in the economy. We examined in detail perfectly competitive markets, monopolies, monopolistic competition and oligopolies. We also covered price discrimination and which types of markets allow for price discrimination.

Week 10

This week was on game theory. We looked at different types of equilibria in oligopolistic markets and how we can apply concepts such as Nash Equilibrium to firm decisions.

Week 11

This lecture took the concepts taught across the semester and added another layer of complexity by introducing externalities. We looked at the costs and benefits to society rather than just consumers and suppliers and examined how the prices and quantities changed.

Week 12

The last week of the semester was a brief overview of Macroeconomics. I found the content taught extremely similar to Macroeconomics for Managers and believe some of the slides were even reused. We covered the three approaches to calculating GDP, learnt what money is and saw how Central Banks can increase the money supply in an economy.

Lectures

There were three lecture streams provided. Two of the streams were taught by Ivan and one was taught by Jonathan. All lecture streams were fully recorded on LMS, but I attended most of the lectures and found them very helpful. There were many worked examples throughout the lectures and the lecturer frequently wrote on slides on the document projector, so everything written in class was recorded online. Although there were recommended readings for each week provided in the subject guide and at the beginning of the semester, I did not need to use the recommended textbook at all as there was sufficient information in the lecture slides.

Tutorials

The tutorials were extremely helpful in this subject. We were provided with 3–4 questions on LMS at the end of each week prior to our tutorials. My tutor told us that many of the questions presented were past exam questions, so they were an additional resource I used in preparation for the final exam. In preparation for our tutorials, our tutor insisted on everyone completing the questions prior to class. Surprisingly, most students followed his suggestion. Although sometimes I felt it was a bit of a waste of time to do all the questions by myself beforehand and then come to class for an hour just to confirm my answers, the tutor regularly added additional insight to the questions and provided more comprehensive answers than my attempts. I found completing the tutorial questions beforehand helped me better appreciate the answers presented in class.

Assignments

The assignment contained two parts. The first part was a research essay of 1500 words. We needed to use three economic factors taught in class and explain how they influence profitability in a chosen industry. We were given free rein to choose whichever Australian industry we liked. This assignment was rather difficult as I hadn't written an essay in years, let alone a research essay. General feedback provided by my tutor for part 1 was that students did not use enough resources and the content written was too broad and did not have enough depth. There was no marking rubric provided and the instructions did not outline a minimum number of resources, but after submission, our tutor told us that relying on three or so reports do not show comprehensive enough research. Graphs or diagrams were also highly recommended.

For the second part of the assignment, we were asked to use theories taught in our subject to explain an observed behaviour in society, in around 500 words. There were a number of prompts provided, however we were required to come up with our own unique question. This shorter essay was not a research essay and we were instructed to make it informal and not use any jargon. The hardest part of this part was coming up with an interesting prompt that I could write 500 words about.

Mid-semester test

We had a couple of days to complete a 1-hour online multiple-choice test. There were only 20 questions in total and surprisingly I found myself pressed for time. The questions were not overly difficult and there was a variety of theory and application questions. if you stay up to date on the lectures and tutorial questions, the mid-semester test should be a breeze.

End-of-semester exam

This semester, the structure of the final exam had changed. Previously there was a part A, where all questions needed to be answered, and then a part B, where students were allowed to choose to answer three questions out of four options. In 2019, there were five questions worth 25 marks each and we were required to choose four questions to answer. We were provided with quite a few past exams written in the old structure and there were past exams online in the library catalogue as well.

In the final exam, the questions followed the style of the questions from part B in the past exams, however the questions from part A were still helpful as revision tools. The two hours provided was just enough time to complete the exam and review the answers. I was worried that the exam was going to contain hard theory questions based on one or two random slides in the semester, but the one I completed thankfully did not. Almost all questions were standard ones similar to the questions in part B of past exams

Concluding Remarks

Managerial Economics covered numerous topics that all tied together nicely at the end of the semester. I found the teaching staff engaging and the timed assessments fair. My only gripe with the subject was the essay we were required to write. More structure in the expectations and a marking rubric would have helped I reckon. Overall, I really enjoyed Managerial Economics.

ECON90047 Macroeconomics 2

Exemption status	CT7 *Business Economics*, A 73 average across this subject, ECON90015 Managerial Economics and ECON90032 Macroeconomics for Managers is required, with no fails.
Lecturer(s)	Professor Efrem Castelnuovo
Weekly contact hours	1 × 2-hour lecture 1 × 1-hour tutorial
Assessments	4 × Assignments, due every 3 weeks 20% 2-hour Mid-semester test, due in Week 6 30% 2-hour End-of-semester exam 50%
Textbook recommendation	None.
Lecture capture	None.
Year and semester reviewed	2019 Semester 1

Comments

This subject was amazing. It honestly almost made me want to change my major from actuarial studies to econometrics. The content was interesting and the lecturer was engaging. Each topic was a further development on the previous and it was an extremely well structured and well explained subject.

Overall, the subject was more mathematical than Macroeconomics for Managers. There were more graphs and equations but the level of mathematics was manageable, especially with an actuarial background.

- 1: Basic Keynesian Model
- 2: IS-LM Model
- 3: Classical Model
- 4: Keynesian Labour Market
- 5: Open Economy
- 6: Barro-Gordan Model
- 7: New Keynesian Model

The subject revolves around modelling the economy and examining key factors that lead to output. It also touches on controls the government and central bank have that can affect the economy.

Lectures

The lecture slides were supplied on LMS before the lectures. They were adequate but not excessive and complemented the lectures sufficiently. Efrem wrote a lot on the whiteboard and the whiteboard notes did not follow the slides exactly, but rather built on the content in the PDF slides. Many of the models had complicated graphs associated with them and Efrem explained them thoroughly during the lectures on the whiteboard. I highly recommend attending lectures since they were not recorded, so skipping one meant missing over half the topic. Many of the graphs were also easier to understand after

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

the explanations on the whiteboard. Not only was Efrem engaging during lectures, the lecture content was also interesting and gave more insight into each model.

Furthermore, Efrem outlined the exam structures in these unrecorded lectures, so it was even more essential to attend to know what to expect for the exams.

Tutorials

The tutorials followed the lectures, with some of the questions coming from the lecture slides. Occasionally, additional questions were provided in class, but they were written on the whiteboard with no paper trail. Some topics didn't even have any tutorial questions at the end of the lecture notes and the only exercises on the topic were written on the whiteboard during the unrecorded tutorial, making it even more essential to attend the classes.

At first, I thought that there were not enough practise questions provided, but combined with the four assignments, there was sufficient material for exam revision in the end.

Assignments

There were four evenly spaced assignments throughout the semester. I found them really helpful towards my learning and understanding of each topic as the content was constantly reviewed and examined in the form of low pressure assignments. For each assignment we received two to three weeks to work on it. They were usually provided before all the content had been taught. Efrem encouraged us to work in groups of up to four people, but we were also allowed to submit individual assignments. Each assignment was similar to undergraduate maths assignments where we had a few exercises to complete. The assignments got more difficult towards the end of the semester and reflected the difficulty of the topics covered.

Some students provided assignments written in LaTeX, but Efrem did not require this and accepted handwritten assignments too.

End of Semester Exam

The final exam covered content over the whole semester. The structure of the end-of-semester exam was similar to the mid-semester exam where it was split into two parts. The first part of the exam was on topics five to seven where we had one exercise to solve in each of the Open Economy, Barro-Gordan and New Keynesian model. This half was worth the bulk of the marks. The second part of the exam was on content from the whole semester and we were again asked to analyse three out of six statements on their truthfulness.

I found I had more time during the final exam than in the mid-semester exam. The questions were fair and Efrem gave us tips during the semester on how to do well in the exam and what we could expect.

Concluding Remarks

Macroeconomics 2 was an incredible subject. The mathematics was enjoyable and a nice break from the many proofs from the core actuarial subjects. I understood the graphs more than the previous economics subject and Efrem was a great lecturer who was clearly passionate about the subject matter.

FNCE90018 Corporate Financial Policy [SM2]

Exemption status	CT2 *Finance and Financial Reporting*, in conjunction with FNCE90060 *Financial Management* and ACCT90004 *Accounting for Decision Making*. An average of 73 across these subjects is required, with no fails.
Lecturer(s)	Dr Les Coleman
Weekly contact hours	1 × 3-hour lecture A 1-hour in-class tutorial is included in the lecture.
Assessments	1-hour mid-semester test in Weeks 5 and 10 2 × 20% = 40% 3-hour end-of-semester exam 60%
Textbook recommendation	*Business Finance*. Peirson, Brown, Easton, Howard, and Pinder. 12th edition, McGraw Hill. There were many copies of the textbook available in the FBE library. I occasionally used it as a reference for additional questions and clarification but ✗ do not think it was necessary for this subject.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2019 Semester 2

Comments

Corporate Financial Policy was a relatively breezy subject. The topics covered were broad and Les brought a vast domain of knowledge and experience to class each week. I just want to note that my review of the content and exams may not apply to students studying this subject in Semester 1 as it is taught by a different lecturer and from speaking with others in my cohort, the two semesters can be quite different.

Subject content by Week:

1. Raising capital: Equity
2. Raising capital: Debt and Leasing
3. Issues with WACC and Capital Structure Policy
4. Payout policy: Forms and influences
5. Mid-semester test 1 & Case study: Landmark Facility Solutions
6. Advanced Topics in Capital Budgeting I: Comparing mutually exclusive projects with different lives
7. Advanced Topics in Capital Budgeting II: Sensitivity, break-even and decision-tree analyses
8. Real options analysis
9. Analysis of takeovers – Part I
10. Mid-semester test 2 & Analysis of takeovers – Part II
11. Corporate Restructuring and Risk Management
12. Corporate Governance and Review of subject

Lectures and Tutorials

In total, there were three lecture streams. Each 3-hour lecture was broken into two components. The first hour or so was spent on a couple of tutorial/practice questions uploaded by Les which covered the previous week's content and the

following two hours were spent going through the lecture slides.

As the lectures were fully recorded on LMS, I found watching them online just as helpful as attending in person. I did find that Les occasionally wrote on the whiteboard in the first half of the semester, which was not recorded. However, I did not find missing these rare whiteboard notes in the latter half of the semester detrimental to my learning in the subject.

At the beginning of the subject, I felt that the classes lacked tutorial questions and worked examples. Although there were a few scattered throughout the slides, the subject was very theory-heavy, which Les did signal to at the start of the semester. He informed us that this class was about more than just being able to calculate the present value of projects and that he focused heavily on understanding the theory. Being an actuarial student and having been enrolled in more practical subjects, I am used to lots of practice questions and learning content through doing exercises, so initially, I did not really know how to study for this subject. Later on, after having completed all the assessment tasks, I felt that the number of questions provided was plenty and there were enough practice questions to do well in the exams.

Case Study

There was one lecture after the first mid-semester test dedicated to a case study on Landmark Facility Solutions. I was really looking forward to this lecture and had hoped to put some of the theory learned into a real-life scenario. Unfortunately, this did not happen, and I don't think the case study was executed well. It was still important to learn the key facts of the case though because it was examined in both the second mid-semester test and the final exam.

Mid-semester test

The two mid-semester tests that covered about 4 weeks' worth of content each. There were 24 multiple-choice questions (each) and Les provided us with past exams for both tests. There was an hour allocated for each exam which was plenty of time to go through all the questions. The mid-semester tests we sat were extremely similar to the past tests provided. There were many identically duplicated questions, so if you learn the content from the past exams, you should easily pass. Both exams had a formula sheet but not all formulas were on the sheet provided. At the start of the semester, Les uploaded a formula sheet and told us that this was the formula sheet in all exams. However, in the second exam, there was a question asking us to calculate the unlevered beta and no formula was given. The problem was that the unlevered beta formula was on the uploaded formula sheet and in the practice exams. So just be careful when studying for the exam. In addition, this subject has some assumed knowledge from FNCE90060 *Financial Management*. In one of the mid-semester exams and the final exam, we were asked to calculate free cash flow, which was not explicitly taught in this subject (maybe mentioned as a throwaway line), but not formula was given on the formula sheet. So, learn make sure you revise content from *Financial Management*. Overall in both mid-semester tests, the cohort averaged 19-20 out of 24.

End-of-semester exam

The 3-hour final exam contained 20 multiple choice questions and four extended response questions. We were provided with a couple of past exams as examples and, as with the mid-semester tests, I found the multiple-choice questions similar to the ones asked in past years. There was plenty of time to complete the exam and many students left almost an hour earlier.

Concluding Remarks

Corporate Financial Policy was an easy subject in Semester 2 and is a good subject to do in the final year of your Master of Actuarial Science as it frees up your time to study the more intense and content-heavy subjects.

FNCE90060 Financial Management [SM1]

Exemption status	CT2 *Finance and Financial Reporting*, A 73 average across this subject, ACCT90004 Accounting for Decision Making and FNCE90018 Financial Management is required, with no fails.
Lecturer(s)	Dr Ali Akyol Dr Maurice McCourt
Weekly contact hours	1 × 3-hour lecture
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	Berk, J. B., & DeMarzo, P. M. (2007). *Corporate finance*. Pearson Education. ✗ This textbook is not required. There are a number of copies in the library as well as PDF copies online that can be used but there is sufficient material on LMS to use.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2019 Semester 1

Comments

This subject was a simpler version of *Mathematics of Finance 1* with more focus on theory than formulas. There was some additional content that was not covered in *MoF1*, such as Capital Structure and Debt and Taxes, but most of the content from this subject was revision. Since I had already completed *MoF1*, *MoF2* and *MoF3*, Financial Management(FM) was overall relatively relaxed.

- 1: Present Value and Arbitrage
- 2: Time Value and Interest Rates
- 3: Investment Decision Rules
- 4: Capital Budgeting
- 5: Bonds
- 6: Stocks
- 7: Payout Policy
- 8: Risk
- 9: Asset Pricing Models
- 10: Capital Structure
- 11: Debt and Taxes

Lectures and Workshops

Dr Akyol took the first half of the semester before the mid-semester test and Dr McCourt took the last half of the subject. Both lecturers spent the first hour going over the previous week's workshop questions and then the following two hours on the new content. I attended over half the workshops and lectures but started watching them online towards the end of the

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semester when the weather got cold.

The workshop questions were taken from the textbook and solutions were supplied at the end of the week after the last lecture stream had concluded. Sometimes, the questions required knowledge from the assigned readings and were not in the lecture slides, but for the most part, the questions were able to be completed after the content had been taught in lectures. They took about an hour or two to complete if you wanted to do them before class, but plenty of students just copied down answers as the lecturer went through them in the workshop.

The lectures were fully recorded and the lecturers rarely used the whiteboard so all the writing this semester was captured in the recordings. Although I went to most of the classes, I believe that solely watching the lectures online would not be detrimental to your studies in this subject. However, I would recommend attending the lectures to meet other students so you can form a study group for the assignment.

Textbook

I used the textbook in my revision for the exams. It followed the lecture notes extremely closely and the corresponding textbook chapters were outlined at the beginning of each set of lecture slides. There was more explanation in the textbook and I referred to it for definitions that were sometimes lacking in the lecture notes.

Assignments

We were given two assignments during the semester and were given the option of working in groups of up to four students or solo if we preferred. Each assignment was given weeks in advance of its due date, so there was plenty of time to complete them. I found the assignments more difficult than I expected for this subject as they were longer analysis pieces and not the typical complete ten exercises using formulas taught in class. There was a lot of discussion required when trying to state and understand the underlying assumptions. I also found the marking for the assignments very harsh. Each assignment was only out of 10 marks and consequential marks did not seem to be given freely. Sometimes four or five answers were worth one mark or an explanation was worth one mark and it was hard to see how much we were required to do. I feel like if the assignment had more marks per question, then it would be more fairly evaluated.

Mid-semester Exam

The mid-semester exam was 20 multiple choice questions in one-hour. We were given additional practice questions from the textbook prior to the exam and one practice exam. The mid-semester exam was reasonably short and there was plenty of time to write and leisurely check over the answers. I thought it was slightly harder than the practise exam provided, but overall still easy. There were also more theory questions in the mid-semester exam than in the practise exam. We were provided with a formula sheet so for exam prep, if you feel confident applying the formulas, I would recommend concentrating more on definitions and theorems. The average across the cohort was 75% which the lecturers were happy about.

End of Semester Exam

The final exam covered all topics across the whole semester and the lecturers mentioned that there was going to be more focus on the latter half of the semester that hadn't yet been examined. The exam had ten multiple choice questions and numerous short answer questions. Again, there was enough time given to complete the exam and I even got the opportunity to leave early which was a nice change to the usual struggle.

For revision, we were provided with one final practise exam as well as additional practise questions on the latter half of the semester. Overall, I felt that we were supplied with more than enough exercises to revise for the exam. During my revision,

I also used the textbook to clarify some key concepts in the final two topics, Capital Structures and Debt and Taxes, and found it helpful in clearing up some definitions that I was unclear on.

Concluding Remarks

This was a relatively relaxed subject and was a nice change from the intense actuarial subjects. The exams weren't rushed and the subject was a nice way to revise content from *MoF1*.

Breadths and Electives

Contents

BLAW10001 Principles of Business Law [SM2]

Lecturer(s)	Dr Rosemary Langford
Weekly contact hours	1 × 2-hour lectures 1 × 1-hour workshop in Weeks 3, 8 and 12 (optional)
Assessments	1-hour online multiple-choice test in Week 4 10% 1-hour online multiple-choice test in Week 9 10% 1.5-hour multiple-choice end-of-semester exam 80%
Textbook recommendation	Lambiris and Griffin. (2017). *First Principles of Business Law*. New copies of the textbook come with a unique code which provides access to an e-tutorial. Unless you prefer the convenience of doing this at home and on your personal laptop, you do not have to buy the book as the e-tutorial can also be done on the computer labs in the law school. Try to get a second-hand if you don't mind missing out on the e-tutorial.
Lecture capture	Yes.
Year and semester reviewed	2018 Semester 2

Comments

Need a relief from *Probability* and *Statistics* or looking for a WAM booster? You're in for a treat! Not only is BLAW10001 Principles of Business Law (PBL) an all multiple-choice subject, there are also no assignments involved which gives you more time to focus on your other subjects during the semester.

As a level 1 breadth subject, PBL provides an introduction to different topics in law, including contract law, agency law, consumer law and tort law. Who knows? You might even consider pursuing a JD after your degree if you really enjoy this subject.

Subject content

Weeks 1–2 provide a general introduction to the origin, purpose and nature of law as well as the Australian parliamentary system. You also learn the legislative procedure of making a new law and how the court interprets a piece of legislation.

Week 3 is spent on the role of courts in law-making (case law) and the structure of the Australian legal system.

Weeks 4–8 cover contract law. This makes up a substantial portion of the subject as it goes through, quite comprehensively, various aspects of contract law – from how parties come together to form a legally binding contract, agreeing on terms of a contract, what happens when there is a breach and the consequent remedies that are available to finally vitiating factors that make a contract voidable.

Week 9 looks at the Australian Consumer Law which is the most practical and applicable in our everyday lives as consumers. You gain insights into and understanding of basic consumer rights and protection and unfair business practices (e.g. false and misleading statements, bait advertising, unsolicited goods etc) that are prohibited under regulation.

Week 10 turns to a different area of law which is called tort law. Focusing specifically on negligence, this topic concerns the liability of the wrongful conduct by one person that causes foreseeable harm to another who is under his/her duty of

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care.

Week 11 covers both the law of agency and basics of property law. The law of agency explores the relationship between three parties: principal, agent and third party, authority and duties of an agent as well as liabilities in the event an agent commits a mistake. Property law was not examinable this semester.

Week 12 is revision and exam preparation where the lecturer basically runs through the entire course and summarises the different topics.

Throughout Weeks 3–11, you will also learn cases in which the different rules of law that are being taught each week have been applied to help the court decide the outcome of the case. You are examined on these cases.

Lectures

Rosemary was particularly strict on not talking during her lecture. Nonetheless, she encouraged everyone to stop her at any point to ask clarifying questions. At the end of each lecture, there is a mini case study to help reinforce the ideas and rules of law covered in that lecture. These case studies are pretty straightforward and Rosemary goes through them fairly quickly but that shouldn't trouble anyone especially when the concepts are still fresh in your head.

I personally only attended a few lectures during the semester as I found it more helpful to pause on lecture capture to write notes and properly read the cases on the lecture slides. I can say that you don't miss out on much by not attending as Rosemary often reiterates the questions that other students asked during the lecture and you will be able to hear them clearly through lecture capture. This probably explains the rather empty lecture hall most of, if not all, the time I was there.

Overall, Rosemary delivers her lecturers well despite her frequent, overused example of her trying to sell her iPhone.

Workshop

Workshops run for one hour in Weeks 3, 8 and 12. They are for you to get feedback and ask questions about the practice tests before each assessment. If you struggled with the practice tests, you should attend these. However, if you think you've done well and understand your mistakes from the solutions provided, the workshops can be skipped.

Assessments

There are two online multiple-choice assessments consisting 40 questions that are be completed in an hour under one sitting. Each assessment will make up 10% of your final grade.

The first assessment in Week 4 was easy and requires minimal revision. You can quite quickly look up the answers in the lecture slides and complete the test comfortably within the time limit.

I carried on this perception going into the second assessment in Week 9 and I was terribly wrong as it was a lot more difficult. You really have to have a solid understanding of the content taught in the few weeks prior in order to excel. Be sure to make notes on the individual cases to avoid wasting time flipping through lecture slides.

End-of-semester exam

You will have 15 minutes reading time and 90 minutes to finish 60 multiple-choice questions.

The end-of-semester exam usually falls on the very last day of the exam period. This can be a good or a bad thing. Good: gives you more time to prepare. Bad: you are the last one to finish amongst your other peers not doing this subject.

A good cheat sheet is key to doing well in the final exam. Investing effort in preparing your cheat sheet will not only give you the opportunity to thoroughly revise the course but more importantly be familiar with the material you're bringing into the exam. Of course, if you are lazy, don't have the luxury of time or prefer cramming, there are plenty of resources online including cheat sheets prepared by past students. But this shouldn't imply you can completely neglect studying for the exam. Do as many practice tests and e-tutorial questions as you can using the cheat sheet you intend to bring in to make sure you have covered all the possible topics you will be tested on. The last thing you want is a cheat sheet that you don't even understand yourself. Otherwise, the end-of-semester exam isn't too challenging and you can definitely breeze through it easily given adequate revision.

Concluding remarks

There is no excuse to do poorly in PBL. I personally really enjoyed the subject. Not only was the workload significantly less than that of my other second-year subjects, I was able to get a taste of what it's like to study law and how it applies to real life scenarios.

Highly recommend doing this subject if you still have room for a level 1 breadth.

COMP10001 Foundations of Computing [SM1]

Lecturer(s)	Professor Tim Baldwin Dr Nic Geard Ms Marion Zalk Ms Farah Khan Guest lecturers	
Weekly contact hours	3 × 1-hour lectures 1 × 1-hour tutorial 1 × 1-hour workshop	
Assessments	Online Grok worksheets 45-minute Mid-semester test in Week 5 Individual project, due in Week 7 Individual project, due in Week 9 Individual project, due in Week 12 2-hour End-of-semester exam	10% 10% 10% 10% 10% 50%
Textbook recommendation	None.	
Lecture capture	Full (both audio and video).	
Year and semester reviewed	2019 Semester 1	

Comments

Faced with the limited capacity to undertake breadth subjects given the constraints of the actuarial course structure, many students will opt to undertake COMP10001 Foundations of Computing, a great introductory subject that focuses primarily on programming with Python v3.6.

For those who have had limited exposure to coding before, Foundations of Computing may be initially quite intimidating, especially when surrounded by peers who have years of programming experience under their belt already. Fear not, as many of these students with strong computational backgrounds will sit a proficiency test within the first fortnight, allowing them to gain an exemption from the subject.

That being said, the content is challenging, and consistent work throughout the semester is crucial if you hope to succeed. Fortunately, I found the study-support within the subject to be immensely helpful when encountering challenging concepts or ideas.

A significant portion of this subject is delivered through the online programming platform, Grok Learning. On this site, you will be able to implement and test any Python code you generate. This immediate feedback loop, made possible by the automated verification process built into the platform, helped me quickly identify and correct any misconceptions that I held.

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Subject content

- Weeks 1-8: Python Fundamentals
- Week 9: The Internet and HTML
- Week 10: Algorithm Families/ Character Encoding
- Week 11: Digital Representation, Fairness and Ethics
- Week 12: Exam revision

Lectures

Lectures for Foundations of Computing were split into two streams, with the majority of lectures presented by Professor Tim Baldwin and Dr Nic Geard, both of whom were extremely passionate about the field of computing.

While the first four weeks of content could be grasped quite easily individually through Grok, I still attended all the lectures as they helped to reinforce the content for the fast-approaching mid-semester test (Week 5). Within the lectures, Tim and Nic would initially introduce the topic, before delving into some more complicated examples. I would strongly recommend that you attempt to follow along and re-create these as I found it extremely helpful in learning how to apply these new concepts.

Following the mid-semester exam, lecture content shifted away from the simple building blocks and syntax of Python, to a more holistic, combination of all the individual 'tools', applied onto larger scale problems requiring more complex functions. It is at this stage where it is imperative to keep up with lectures lest you become overwhelmed by these increasingly difficult topics.

By the end of week 8, lecture content shifts away from Python to an amalgam of various topics ranging from HTML to the Ethics of Computing. Although seemingly small, these topics are all examinable, meaning it would be remiss of you to ignore them when revising.

Interspersed throughout the semester are three guest lectures delivered by industry professionals. For this semester, we were exposed to topics relating to Cognitive Science, Quantum Computing and Verifiable e-Voting. All three of these were extremely enjoyable, as the guest lecturers' passion was enrapturing, while also illustrating some different pathways computing can take you. These guest lectures are also examinable, however, the extent is often limited to the higher-level concepts rather than the low-level ideas such as the technicalities behind Shor's Algorithm.

Tutorials/ Workshops

Tutorials were segmented into two parts, a one-hour traditional classroom tutorial, and another one-hour computer lab workshop. I personally found the classroom tutorials to be beneficial in consolidating the coursework covered in lectures while also providing an opportunity to practise writing code by hand in a style similar to mid/end-of- semester exams.

On the other hand, the computer lab workshops were of minimal use unless you had specific queries in relation to Grok worksheets or projects. This was primarily due to the style of the workshop where there was little guided work to complete, and demonstrators were there to help with individual problems rather than teaching/revising concepts from lectures. That being said, I still attended all of these workshops to ensure I allocated an additional hour each week to computing.

Projects/ Grok Worksheets

Throughout the semester, there were three individual projects, each contributing 10% to the final grade, and 16 Grok worksheets worth a combined 10%. Altogether, students need to achieve a minimum of 20/40 to satisfy the hurdle in this section.

The three projects across the semester each consisted of 4 smaller sub-problems and an additional bonus question. With 2-3 weeks to complete each project, you may be tempted to put them off until closer to the due date, but I would warn against such a decision. As many students discovered belatedly, although purely writing code can be quite fast, the process of generating an efficient, accurate solution to the problem will take a considerable period of contemplation.

Another point to keep in mind is that code stylistics/ readability and commenting were worth a sizable portion of each project and represent easily attainable marks that all students should strive to gain. To do so, ensure that all code is PEP8 compliant, and that the naming of variables in addition to commenting will mean someone with minimal programming background will still be able to deduce the purpose of your program.

The 16 Grok worksheets, which were periodically released in sets, each of which were due roughly fortnightly, served as a great way to practise the lecture content. In addition, should you ever get stuck when attempting these worksheets, the 'forum' and 'tutoring' available within the Grok website can provide detailed responses in regard to any concerns you may have. Without any limit on the number of submission attempts, completing all 16 worksheets perfectly was quite common.

Mid-semester test

The mid-semester test was a 45-minute, 40 mark closed-book paper examining content covered in the first four weeks of semester. Whereas previous semesters' tests were later in the teaching period, thus covering more complicated programming content, our test was relatively straight-forward. To prepare, I would recommend attempting to re-do all assessable Grok worksheets and the released past mid-semester tests by hand, as coding on paper is significantly more challenging than on a computer.

End-of-semester exam

As was the case in previous years, the end-of-semester exam was out of 120 marks, and consisted of three components, namely the Code Interpretation, Generating Code and Conceptual Questions sections. Out of these sections, the Generating Code portion was the most technically challenging as students were required to write Python code with minimal framework to start from. Fortunately, our lecturer informed us that the level of difficulty in this portion had been toned done to balance the effort/marks proportion for this area. Instead, the theoretical questions for our exam became trickier and required a rather in-depth understanding of different character encodings (a sub-topic many students had disregarded when studying).

While there is considerable work required throughout the semester to perform well on the projects, if you have consistently invested time into grinding through the Grok worksheets, you will find that you already possess much of the necessarily skillset to tackle the first two sections of the exam. For me, revision for this subject during SWOTVAC just consisted of familiarising myself with the theoretical components covered in the latter weeks of semester, saving me time to study for the more challenging, core actuarial subjects.

COMP20005 Engineering Computation [SM1]

Lecturer(s)	Professor Alistair Moffat
Weekly contact hours	3 × 1-hour lectures 1 × 2-hour workshop
Assessments	Mid-semester test 10% Individual assignment 1 due in Week 9 10% Individual assignment 2 due in Week 12 20% 3-hour end-of-semester exam 60%
Textbook recommendation	Moffat, A. (2012). *Programming, Problem Solving and Abstraction with C* (2nd ed.). Frenchs Forest, AU: Pearson Education Australia. ✓ A MUST as it follows the subject closely, and has many examples and exercises for you to peruse.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2018 Semester 1

Comments

Have you ever gotten frustrated at how a subject was structured? The lecture pace was too slow, the content was mainly memorization, and the lecturer was distant and impassive?

Well, Engineering Computation restores hope with the super passionate sassy lecturer, Alistair Moffat (who is probably chaotic neutral), the content saturated lectures, and a holy textbook.

Later in the review, I'll be comparing this subject to the more friendly, but plain and less exciting *Foundations of Computing* with nearly double the cohort of EngComp, but less than half the interest.

Subject content

Following the clear structure of the textbook, Alistair begins the subject with simple background information on computers, programming, types of variables in programming and simple operations you can perform. You then solidify this knowledge through beginning to code simple programs, with plenty of examples being covered in lectures and offered in the textbook exercises.

Alistair then adds to your toolkit of just operations and simple functions in the basic C library by introducing conditional and iterative looping statements (`IF`, `WHILE`, `FOR` statements). This is where the importance of the ability to visualise and apply logic starts revealing itself. And you practice again with plenty of exercises provided in the textbook. The beauty with programming is also that you get to imagine problems to be solved and actually attempt them and implement what you've learnt in creative ways.

The next jump in difficulty (the following chapter in the book) is creating functions of your own. Practice more. And then your world expands again as you learn about arrays, and the genius of data structure hits you. The first assignment tests you on arrays. But it is structures that make you realize the true beauty of programming. And this is when the combination

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of everything you've learnt, arrays of structures in functions, the complexity of pointers to structures with arrays, reaches a peak. Cue the second assignment.

And now that you've learnt the technical skills and the ins and outs of C, the subject content takes a turn to application of those technical skills.

You learn about the most efficient ways to solve problems to reduce time spent computing (this is covered more extensively in COMP10002 *Foundations of Algorithms*, which you are not allowed to take with EngComp, that also uses the same textbook as EngComp and is taught by Alistair in Semester 2). You also learn about the binary, hexadecimal and what different numbers look like as bits in the computer – this part requires ability to pick up patterns and apply conversion rules.

And that is the story of Engineering Computation.

Lectures

Although it is alright to just watch the lectures online, the lectures are truly engaging as Alistair often demonstrates with his hands and stacks of paper to help you visualize how C works, so I, like everyone else, highly recommend attending lectures.

Though I personally enjoyed the online experience of lecture capture and Alistair's voice at 1.7x speed throughout the semester, in reflection of my entire experience, my verdict is that skipping EngComp lectures and not keeping up with the kar-disiplines is not for the average or just above average student and it's better to play it safe with this difficult subject and doubtfully nice lecturer.

Also, there are plenty of jokes and puns made by Alistair.

Textbook

Prior to the lectures and workshops, it is helpful to have a read through the textbook (an easy read.

The textbook is set up effectively (as expected of a programmer for the writer), each chapter following the other logically and filled with explanations, demonstrations with sample programs and output, and excellent exercises. There are no sample solutions in the book, but Alistair will either provide them on the LMS and/or explain them in lectures, or you can ask your tutor as well.

Workshops

Although attendance is not compulsory, if you need help with doing exercises, have questions about the assignment or just need a time to be disciplined and actually do work, workshops are great. You can also attend other workshops as long as they are not full so be sure to utilize this resource.

(Since I skipped often) *Apparently* the workshops were usually 1 hour of discussion and demonstrations with the class and then 1 hour of coding on your own with an additional tutor. During the period of programming for the assignment however, the tutors were willing to assist a bit with your program bugs and it was great just working on your assignment then.

Mid-Semester Exam

A 30-minute challenge to look for mistakes in a sample code and write a function by hand. The semester I took it, the mid-semester exam was quite hard, but Alistair compensated by making the rest of the assessments not quite as hard.

Assignments

Both of the assignments this semester were based on sample data, and you wrote a variety of functions to manipulate the data to generate output in different stages.

Key points were to be pedantic about details in the output and the efficiency and logic behind your code. Both assignments punish late starters heavily, so do not leave it till later and you'll be a happy camper.

End of Semester Exam

A 2-hour version of the mid-semester exam, with lines of code to fix and more functions to write out, but it also tests the methods to solve problems taught later in the lectures as well as short answer questions on number representations and pointers.

This semester, there were 3 sample exams supplied so you get ample practice in addition to studying the sample code Alistair provides in lectures and from the exercises.

Comparison to Foundations of Computing

The greatest difference between *Foundations of Computing* and EngComp would be the method of coding.

In EngComp, you are required to use a program called JEdit to write out your code, then compile and run it on a separate program. Even submitting the assignment is much more tedious than just uploading a file (though you learn about connecting servers just through submitting).

However in *Foundations of Computing*, you are guided through a series of online exercises on Grok that tell you what's wrong, allows you to communicate with your tutor, and is much more user friendly.

But do not be daunted by the unfriendly JEdit program or the angry error messages you will receive through Terminal (on the Mac), as in the end coding is simply about what you write and the output generated, and you will get past the unfriendly interface in EngComp. At first glance, *Foundations of Computing* seems easier but it is just as easy to grasp JEdit so this is not something to be taken in consideration when weighing the two subjects.

Additionally, *Foundations of Computing* utilizes Python, a much more beginner friendly language, and C is much more unforgiving in terms of syntax, but like the comparison between Grok and JEdit, the structural difference is secondary to the actual programming done. In addition, learning a harder language to start and building a keen attention to detail and syntax also helps with all future coding endeavours, even if you're just writing code in Matlab.

Ultimately, EngComp is a carefully designed subject that is more than just a subject to add to your list to show that you have done computing, but a subject to show you how fun programming can be. If you know you love a bit of a challenge and learning, EngComp might suit you better.

Final Comments

A really well structured subject that sets you up for certain success if you practice enough and are able to grasp the abstraction and higher level thinking behind coding but to hit the top scores, it still requires a certain penchant and mind for programming.

The quote by Abraham Lincoln – "If I had more time, I would have written a shorter letter" – is truly exemplified in programming.

```
/* Programming is Fun! :) */
```

COMP90038 Algorithms and Complexity [SM2]

Lecturer(s)	Toby Murray Andres Munoz Acosta
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour workshop
Assessments	Weekly online tests 0% (hurdle req., see Assessments section) Individual assignment due start of week 7 15% Individual assignment due start of week 12 15% 3-hour end-of-semester exam 70%
Textbook recommendation	Levitin, L., (2012). *Introduction to the Design and Analysis of Algorithms*. (3rd Ed). Upper Saddle River, US: Pearson Education. The textbook is referenced, but I don't think you need it for the subject.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2018 Semester 2

Comments

Obviously, the main subject matter covered here are algorithms and complexity. So what exactly do we mean by these two terms?

Essentially, an **algorithm** is a sequence of *unambiguous* steps that you can follow to solve any instance of a specific problem, typically carried out by a computer. For instance, how would we sort a list of objects? A naïve approach would be to scan through the entire list, looking for the smallest object and listing it as the first element in your new sorted list, then the second smallest and listing it as your second, and so on until you have a new sorted list.

It shouldn't be too hard to realise that this algorithm is one that works (i.e. you end up achieving your goal of sorting the list). However, there are a lot of other different algorithms that can also be used to sort lists.

Let's think back to our naïve approach. This approach might work okay for small lists (e.g. 5 to 10 elements). However, once your list becomes larger and larger, the amount of time it takes to perform all the steps and complete the algorithm grows at a high rate. The length of time it takes for a less naïve algorithm to complete will also grow as the size of a list increases, but it may not grow as quickly as the naïve approach. This is what we refer to as **complexity**.

Why would an actuary care about any of this? This subject introduces a number of different approaches you can use when trying to solve a problem, which can be applicable when you are (for example) required to code up a macro to do a specific task for you.

Subject Content

The content in the subject can roughly be grouped into these overarching topics:

Problem-solving Techniques – different problem-solving strategies are covered here, with a plethora of examples to illustrate how they work. The example earlier in the review for sorting a list is an example of the *brute force* method.

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However, some more clever methods make use of the *decrease-and-conquer*, *divide-and-conquer*, and *transform-and-conquer* methods. Some of these methods you would have (unknowingly) employed in your studies – for instance, bisection is an example of a *divide-and-conquer* strategy.

Later on, more sophisticated ideas such as *dynamic programming* and *greedy algorithms* are also explored.

Complexity – for each of the algorithms introduced, its complexity is also discussed (i.e. how the length of time it takes to complete an algorithm scales with the size of the problem fed into the algorithm). To quantify an algorithm's complexity, the subject uses the computer science version of Landau notation (gasp). While Big-O notation will be familiar to you from *Accelerated Mathematics 2*, things such as Theta notation and Omega notation will be somewhat unfamiliar. However, it shouldn't be too hard to learn them. Somewhere in the midst of the study of each algorithm, the **master theorem** is discussed, a powerful result that helps to determine the complexity of a recursive algorithm.

In between each of the techniques studied, an overview of data structures is also provided.

Data Structures – there are a number of different ways of storing data in a computer; you may already be familiar with arrays and lists. However, there are a number of other data structures (referred to as *abstract data structures*) that are introduced in this subject as well. Different algorithms may require the use of a specific type of data structure, so a solid understanding of each of the different data structures used is essential to study these algorithms. Some examples of data structures studied are *stacks* (the latest element placed into a stack is the first one that is taken off), a queue (the oldest element placed into a queue is the first one that is taken off), graphs (a series of "nodes and edges" where two nodes are connected by an edge), binary trees (a more complicated list), and more. Don't feel overwhelmed, each of these structures are covered in-depth in tutorials and lectures.

Towards the end of the subject, Huffman encoding (a method of storing information using less memory) and NP-completeness (look it up, it's complicated) are covered as well. However, these were not examinable.

Algorithms in the subject are presented using *pseudocode*. This left a lot of uncertainty among students for assessments. See below for more detail.

Lectures

There was one stream and two lecturers. Toby took the first half of the semester's lectures while Andres took the second half. Both were excellent at explaining and delivering subject content and making use of slide animations for illustrations and the document camera to work through examples. Occasionally the lecturers would ask questions expecting a response from students. Luckily students in this subject are a lot more responsive than in actuarial lectures, so there were rarely any awkward silences.

Slides were released weekly before the lecture began. However, the annoying thing about slides was that for each frame of animation, there was a new slide in the slide pack. This made it infeasible to print slides for lectures. So it is probably better to just write your own notes in a notebook, rather than go through the hassle of printing each unique slide from the slide pack.

I only went to the first lecture of semester and decided it wasn't worth the effort to go to the remaining lectures in person. Instead, I watched them all in one go at the end of each week (at $> 1.5 \times$ speed as usual), and I don't feel like this decision disadvantaged me at all.

Workshops

Workshops ran the same as tutorials do – 1 hour where tutorial problems are discussed with the tutor, and maybe a review of lecture content from the week before. Each week there was a set of tutorial problems, ranging from as low as 3 problems

to as many as 15ish.

While lecturers expected students to attempt tutorial problems before coming to the tutorial, I did not get that same impression from tutorials. My tutor would regularly give us time during the tutorial to solve a question before discussing the solution.

Ultimately your workshop experience will depend on your tutor.

Assessments

Throughout the semester there were **compulsory** weekly tests from weeks 2 to 12, covering the previous week's content. These opened the Friday before the content was covered and closed the Tuesday the week after the relevant lectures, giving you plenty of time to attempt the quiz. These questions were not exactly trivial and required some careful thinking as well as a pen and some paper. You needed to get 100% on 8 of the 11 quizzes to pass the subject, so don't neglect them. You get as many tries as you want, so you can even brute-force your way through the quiz through guessing and checking before the content was even delivered. There were also two diagnostic tests (mathematics and programming) in week 1 designed to give you an idea of what was assumed knowledge.

Assignments were released roughly 3 weeks before they were due. They had roughly 4 to 5 questions each and were a leap above question encountered during the semester as well as what was in the end-of-semester exam. The most challenging questions on these assignments were those that required us to come up with our own algorithm to solve a specific problem. While there are multiple ways of solving the same type of problem, the challenge comes with coming up with the one that is the most efficient (in terms of complexity).

The lecturers' insistence that you use pseudo-code to present your algorithms may cause a bit of grief, as the subject presented no standardised set of rules for us to use for our pseudocode. This left a lot of uncertainty with regards to what was acceptable and what wasn't. However, as long as you generally follow the unwritten rules that the pseudocode examples in lectures followed (albeit they were occasionally inconsistent there), you should not lose any marks for any "shoddy" pseudocode.

End-of-Semester Exam

The exam is a standard 3-hour science exam. What you may not be used to is providing your responses on the exam paper instead of in a separate script book. This shouldn't be a huge deterrent though.

In 2018, we were given 2 practice papers, which were very indicative of the type of questions on the end-of-semester exam. However, no solutions were provided. The lecturers encouraged the student cohort to set up a Google Doc to work together to create our own set of solutions. However, the lecturers did not verify them, but 100 people on the same Google Doc can't be wrong… right?

Honestly, if you made it through the 3-year undergraduate degree, this exam should not cause you any headaches. As usual, do tutorial problems and practice exams, making sure to understand the solutions wherever they are provided. In terms of subject content, I would prioritise the following:

- Understanding how to perform each algorithm on a given set of data;
- Complexity (deriving it from a recursive formula or through analysing an algorithm);
- Data structures – how each of them works;
- Qualitative features of different algorithms.

Questions here include (but are not limited to):

- What will the final binary tree look like if you insert these 5 elements in order?

- What sort of sorting algorithm should be used if you want to do [blahblahblah]?
- Design an efficient algorithm to solve this type of problem. Inefficient algorithms get half marks.

The hardest question on the exam will generally be the last type of question listed. I know in my exam many students spent between half-an-hour to an hour on the first 11 questions, double-checked them, and spent the remaining time on the 12th question (which required us to design an efficient algorithm).

Suitability as a Breadth

If you have any programming background whatsoever (whether you did COMP10001 *Foundations of Computing* or COMP20005 *Engineering Computation*), this subject may be a tempting follow-up if you study a post-graduate degree. However, I personally feel like your elective or breadth is better spent on choosing something else. Many of the problem-solving techniques were covered in *Engineering Computation* (if you did that), so I felt like I was studying things that I had already learned in the past.

If you want something you don't need to dedicate too much time in, this is something you may want to do as an Actuarial student. If you don't mind dedicating a non-trivial amount of time each week into a subject, maybe look into a level-3 mathematics subject.

ECOM30004 Time Series Analysis and Forecasting

Lecturer(s)	Barry Rafferty	
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour tutorial	
Assessments	4 individual assignments during the semester 2-hour end-of-semester exam	4 × 10% 60%
Textbook recommendation	None.	
Lecture capture	Full (both audio and video).	
Year and semester reviewed	2018 Semester 2	

Comments

In ECOM30004 Time Series Analysis and Forecasting, you learn how to fit time series data to models with various features and evaluate the fit and forecast ability of these models. It is usually taken as an Honours/Master's breadth.

Many of the models explored in the course are familiar, such as AR/MA/ARMA models and ARCH/GARCH volatility models, which are covered in previous actuarial subjects. This subject can be considered a more practical extension, where you use EViews software to apply these models to actual data and interpret the results.

Subject Content

The subject content has 5 main topics:

- Trend stationary processes – modelling trend and seasonality; stationarity and autocorrelation; AR/MA/ARMA models;
- Difference stationary processes – seasonal ARMA/ARIMA models; unit root testing; forecasting and forecast evaluation;
- Volatility modelling – symmetric (ARCH, GARCH, ARCH-in-Mean) and asymmetric (TARCH, EGARCH) volatility models;
- Stationary multivariate models – specification, analysis and forecasting of Vector AR models;
- Nonstationary multivariate models – cointegration; Vector Error Correction Models.

Lectures

The lecture content is pretty easy to understand conceptually, particularly with an actuarial background. The most unfamiliar area will be the use of the EViews program, which makes up a large part of the lecture content; however, through the lecture examples and tutorials, it is not too hard to pick up.

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

Tutorials

The tutorials generally focus on using the EViews program, with the exercises based on the lecture examples. As an actuarial student, it is likely your first time using the EViews program. Hence, the tutorials are particularly useful, as it is where you can learn step-by-step how to use EViews to perform all the model fitting/analysis/evaluation that is seen in lectures.

However, the tutorials usually cover a lot of content, which is hard to fit into the 1-hour timeframe. Depending on the tutor, you may find that the tutorials are often unfinished, or that the tutor has to speed through the content. This was particularly the case in the first week, when most of the class had never used EViews before. In addition, it usually takes a while to load EViews, and many of the computers in the lab periodically do not work, so come to tutorials early if you can.

The tutorial content is quite important for the assignments, so even if you don't attend the tutorial, be familiar with the content and know how to use the various aspects of EViews.

Assignments

Each assignment is split into 2 sections:

- The first section contains 'Conceptual Questions' which are theory-based, and generally involve mathematical derivations. They shouldn't be difficult for an actuarial student. Refer to lecture notes.
- The second section contains 'Empirical Questions' based on a provided data set, which you need to use EViews to complete. These questions generally follow the style of tutorial EViews questions, with some extensions. Hence, it helps if you attend the relevant tutorials, or at least look over the tutorial answers.

Generally, the assignments can be time-consuming (particularly the EViews section) but are not that difficult. In terms of EViews itself, you can access it through the computer labs or via *my*UniApps. *my*UniApps may randomly fail, so plan your assignment completion time wisely. Cracked versions of EViews do exist, but obviously this review does not condone their use!

End-of-Semester Exam

The exam consists of 3 (large) questions relating to different areas of the subject content: Q1 covers stationary processes, Q2 covers volatility modelling, and Q3 covers multivariate models. Generally, Q2 will be worth less marks than the other two. The exam is 2 hours long (in addition to 15 minutes reading time), which is roughly enough time to complete all the questions.

The exam is understandably much more theory-based than the assignments. You should know in detail the features of the various models and tests. The only EViews knowledge required is how to read and interpret the EViews outputs that are in the paper.

Two past exam papers were provided, which gave a relatively fair indication of the difficulty and content of the actual exam. I advise you to do them!

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.

ECON20002 Intermediate Microeconomics [SUM]

Lecturer(s)	Ms Svetlana Danilkina
Weekly contact hours	2 × 2-hour lectures 1 × 1-hour tutorial
Assessments	Tutorial attendance and participation 10% Online multiple-choice test 10% 2 individual assignments 2 × 10% 2-hour end-of-semester exam 60%
Textbook recommendation	Pindyck, R. S., & Rubinfeld, D. L. (2013). *Microeconomics*. (8th ed.). Pearson Education. ✗ This textbook was never explicitly used, so I do not recommend purchasing it.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2019 Summer Term

Comments

ECON20002 Intermediate Microeconomics can be completed over the Summer or in Semester 1, with differing focus and styles of examination in these two study periods. In the Summer, the exam was very theory-heavy, so there was a lot of writing (with basically no calculations). In Semester 1, the exam was much more mathematics-heavy, so there was a lot of calculations (with basically no written work).

Subject Content

1. Consumer Theory
2. Producer Theory
3. Markets
4. General Equilibrium
5. Game Theory
6. Oligopoly
7. Choice under Uncertainty
8. Economics of Information (not examined)

Lectures

Svetlana's lectures were very dense, with numerous concepts being covered in one lecture. And her content-heavy slides only made each lecture more overwhelming. However, I would advise you to focus on the story that Svetlana tells, as her verbal explanations are extremely logical, with each sentence flowing onto the next. After disregarding much of her lecture slides, I found the content a lot easier to follow. She is not a lecturer that reads off the slide, in fact, she probably says

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about 10% of what is on the slide, but she does so to ensure a very crisp narrative is told with the concept she teaches. This is what makes her such a great lecturer and one of the best lecturers I have had.

Because each concept typically builds onto the next, I found that as soon as I did not understand something, the rest of the lecture became a total waste of time. As such, I only ended up attending one lecture in person and would highly recommend watching lectures online. Personally, I found the content to be quite straightforward once I understood the narrative she was telling.

Tutorials

The tutorials were very well structured, composing of a pre-tutorial component and problems to work on in the tutorial. The pre-tutorials were quite easy to complete, and the tutor will check your work during randomly selected tutorials, which will form a part of your tutorial participation mark. What I found misguiding was the style of questions in the tutorials as compared to the end-of-semester exam. Most – if not all – questions in the tutorials were mathematical and required calculations, but the end-of-semester exam lacked this aspect. Therefore, I found that tutorials were not a good reflection of the final exam but was good practice to ensure you understood the content.

Multiple Choice Quiz

As with other Economics subjects, the multiple-choice quiz was not there to trick you. In this subject, the quiz only covered Consumer Theory. Questions were extremely similar to the tutorial questions, so I would recommend preparing for the quiz by attempting these questions again. Svetlana also provided us with a practice quiz, which was of similar difficulty. The average mark was $8/10$.

Assignments

Assignment 1 covered Consumer Theory and Producer Theory and was very calculation-heavy. Assignment 2 covered Markets and General Equilibrium and was a lot more theory-heavy. Nevertheless, neither assignment was tricky, in that answers could be found in either similar tutorial questions or were explicitly stated by Svetlana in a lecture. Students should generally do extremely well on these assignments.

End of semester exam

Svetlana made it clear that the exam will be similar to tutorials and assignments, and some questions were indeed nearly identical. Therefore, such questions should generally be done to a very high standard and can be prepared for by completing all tutorial questions again. What was unexpected was the sheer amount of writing that needed to be done in the exam. As tutorials were very calculation and mathematics-heavy, I was under the impression that the final exam would also be of a similar style. However, there was only one big question that focused on calculations, with most other questions requiring a written explanation of a concept. This means that it is not enough to understand how to do tutorial questions, but the logic and development of all models should be crystal clear. The past exams provided were 5 to 10 years old and are good indicators for the Summer exam's difficulty.

Looking back, the exam was extremely fair, perhaps almost too fair for a second-year subject. My only advice would be to focus on understanding the narrative Svetlana tells (and being able to retell this story) and be comfortable with both writing and calculation style questions. Calculation questions can be prepared for through the tutorial questions, while writing questions can be prepared for by talking through the story to yourself for every concept in the semester.

FNCE20002 Management of Financial Institutions [SM2]

Lecturer(s)	Dr Zhen Shi
Weekly contact hours	1 × 2-hour lectures 1 × 1-hour tutorial
Assessments	1-hour mid-semester test in week 6 — 15% Group Case Report and Presentation in week 10–12 — 15% 2-hour final exam — 70%
Textbook recommendation	Lange, H., Saunder, A., & Millon Cornett M. (2015). *Financial Institutions Management*, 4th edition.
Lecture capture	Partially recorded for the first three weeks, whereby the lecturer recorded the first hour and conducted the second hour without recording to encourage in-class discussion. However, this approach was unpopular as many students fell behind on lecture content, so for the rest of the semester lectures were fully recorded.
Year and semester reviewed	2018 Semester 2

Comments

This Commerce elective is an interesting expansion of *Principles of Finance* and *Corporate Financial Decision Making*, focusing heavily on financial institutions' roles in the financial system. Techniques on pricing financial instruments and managing risk in the market economy are covered in this course.

Subject content

Lectures and tutorials

In Lectures 1–3 the lecturer only recorded the first half of the lecture and engaged in discussions for the second half of the lecture, which was supposedly 50% examinable. However, due to student complaints of difficulty with keeping up with the lecture materials, full recordings became available thereafter. In Weeks 1 and 2, the material focused on refreshing basic topics such as pricing bonds, option contracts and theoretical content like the purpose of financial intermediaries. From Week 3 onwards, the following topics were covered: tools financial intermediaries use to mitigate risk such as the repricing gap; hedging; derivative pricing; interest rate swaps and securitisation . These topics were thoroughly covered and quite interesting to learn. Interest rate swaps and securitisation, covered in Week 6 and 7, were definitely the most challenging topics, but plenty of tutorial questions made it easier to master . The lecturer's explanations were often adequate, but could be convoluted and difficult to follow at times. Only after I had attempted the tutorial questions for that week that did the lecture material begin to make sense.

Tutorial attendance was not recorded and thus week by week, tutorial attendance began to drop dramatically. By the last few tutorials I was often the only student attending the tutorial. The tutor's explanations were helpful, especially in explaining questions I couldn't complete myself, and more thorough than the tutorial answers provided at the end of each week. Although it was possible to just work from the tutorial questions and answers provided, the extra explanation was helpful for more difficult concepts, such as interest rate swaps and securitisation techniques.

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Week 1	I. Introduction to banking
	II. Overview of the financial system
Week 2	The basics of bond pricing
Week 3	Managing interest rate risk using repricing and duration gap analyses
Week 4	The basics of derivatives pricing
Week 5	Managing interest rate risk using derivatives - Bond option
Week 6	Mid-semester exam
Week 7	Managing interest rate risk using derivatives - Swaps
Week 8	Managing interest rate risk and liquidity risk using securitisation
Week 9	Managing credit risk, market risk and liquidity risk
Week 10	I. Non-banking financial institutions (1)
	II. Guest speakers
Week 11	Group presentations
Week 12	I. Group presentations (2)
	II. Non-banking financial institutions (2)

Assessment

A 1-hour multiple choice mid semester test was conducted in Week 6, covering the first five weeks of content. A practice mid-semester test was provided with answers which turned out to be very similar to the actual test. It was found to be relatively easy by most students.

The group case report and presentation required groups of ten to choose one case out of four provided and then write a 10-page report based on the questions given. I found that working with a group of ten people became difficult at times as team members' work could overlap, making some of it redundant. However, it made completing the report a relatively easy task as so many people were working on it. Presentations were held during lectures and focused on summarizing the report and explaining it to the rest of the cohort and lecturer. Half of the marks were allocated towards answering questions from the audience about our presentation and asking questions to other students' presentations .

The final exam was a 2-hour closed book exam, with an emphasis on Lectures 5-10. It consisted of two sections where Part A consisted of "fill in the blank"-type questions and accounted for 40% of marks, while Part B consisted of calculation/explanation questions and accounted for 60% of marks. While Part A was a breeze, Part B was a little more difficult than expected and required more steps than learnt in tutorial questions or the practice exam provided. There was some overlap again from the practice exam questions and the actual exam, but some Part B questions such as hedging or derivative questions were more extended and challenging.

Concluding remarks

Overall, it was an interesting subject to learn about calculations and techniques used by banks to maximize their role in the financial market and how risk could be managed. I would recommend it to those who are interested in working in the banking sector or want to gleam an insight into the workings of financial intermediaries.

FNCE20005 Corporate Financial Decision Making [SM1]

Lecturer(s)	Professor Chander Shekhar
Weekly contact hours	1 × 2-hour lectures 2 × 1-hour tutorial
Assessments	Mid-Semester Exam in Week 7 20% Tutorial Participation 10% 3-hour end-of-semester examination 70%
Textbook recommendation	Peirson, G., Brown, R., Easton, S., Howard, P., & Pinder, S. (2015). *Business Finance* (12th ed.). North Ryde, AU: McGraw-Hill. ✗ I do not believe the textbook is necessary. See Textbook Section below for more comments.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2019 Semester 1

Comments

For students pursuing an Actuarial/Finance double major, Corporate Financial Decision Making (CFDM) is a core subject that leads to the required 3rd year Finance subjects.

This subject has a very clear structure. The topics for each week are outlined at the very beginning of every lecture which helps you see the big picture of corporate finance and finding links between different topics. The content covered each week is consistent and the order of the topics also flow logically.

Subject content

- Week 1: Options
- Week 2: Payout Policy
- Week 3: WACC and Capital Structure Policy
- Week 4: Raising Capital: Equity
- Week 5: Raising Capital: Debt & Lease + Guest Lecture
- Week 6: Advanced topics in Capital Budgeting Sensitivity, Breakeven and Decision Tree Analysis
- Week 7: Mid-semester Test
- Week 8: Advanced topics in capital budgeting: Real options
- Week 9: Takeovers I
- Week 10: Takeover II
- Week 11: Corporate Restructuring and Guest Lecture 2
- Week 12: Risk Management

Lectures

The lecture slides for this subject contain almost all the details you need to know for the exam. During the 2-hour lecture every week, Chander explains the concepts and examples in detail and provides a lot of intuition behind the theory. So, it

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is beneficial to go to the lectures or watch the recordings online as they help a lot with understanding and memorising.

In addition, it is recommended to use the questions in the "After Today's Class" section of each lecture as a self-check at the end of each lecture to make sure you keep up with the requirements.

Tutorials

There is a 10% participation mark credited for the attendance of tutorials, which are essentially free points to earn. Each week, you need to hand in Part B of the tutorial questions and tutors will mark attendance based on these. As long as you have shown a good attempt at the questions, you will receive full marks. The thing to be noted is that you can only attend the class you enrolled in to earn the participation mark, which may be uncommon for students used to attending make-up tutorials.

The tutorial questions are relatively straightforward. It provides you motivation to keep updated on lectures, however, in isolation, they will not be sufficient for exam preparation.

Textbook

While the textbook does explain the lecture material well, it includes a lot of additional material which may not directly help with exam preparation, thus meaning it is not crucial for this subject. However, if you are hoping for an extension on the topics covered in this subject, this will be an excellent resource for additional learning.

Mid-Semester Exam

The mid-semester exam consisted of 20 multiple choice questions and was worth 20% of the final result. Although the concepts were relatively straightforward, tricky questions provided options like:

d) More than one of the above
e) None of the above

Another tricky style is to ask you to choose the closest answer to the numerical solution. In these, the exact answer will not be included in the options provided. This means that when you have arrived at an answer, you will not have any confirmation of its accuracy. For these, while carefully checking your answers is important, make sure not to overthink your solution.

End-of-Semester Exam

The final exam was very much like the practice exam and past exams from previous semesters taught by Chander. The only difference in this semester is that section B and C were combined into one section and short response questions replaced the true or false questions. This in fact made it less tricky since you no longer need to struggle with the wording of the statements, with the only requirement being to put down whatever you know about the theory in a straightforward manner.

Half of the questions are theory based, thus requiring you to memorise basically all the details and understand the intuition behind them. This section will be rather time consuming.

The other half are calculations. These questions are much easier for Actuarial students especially as the formula sheet is provided. For preparation, it is helpful to go through all the examples in lectures and tutorials. Do them at least once with your books closed. There are some tricks in these problems, so read the questions carefully and as long as you have fully understood the process, you will be fine with the exam.

Final Comments

The total time commitment for CFDM is much less than the actuarial subjects. Besides, it provides you an overview on how different policies impact corporation's financial decision making. I would suggest choosing it as an elective even if you are not looking for an Actuarial/Finance double major. It will give you a broader idea of real-world performance of companies, while honing the many technical skills you have learned in actuarial subjects. Most importantly, this is a good opportunity to boost your WAM.

IBUS20007 International Business Experience [SUM]

Lecturer(s)	Dr. Lauren Johnston
Contact hours	1 × Information session 1 × Pre-departure briefing 2 weeks travel time overseas Note: It is also compulsory for students to attend the information session and the pre-departure briefing.
Assessments	Reflective Journal (1000 Words for Undergraduate, 1500 for Postgraduate Students) 30% Research Essay (2000 Words for Undergraduate, 2500 for Postgraduate Students) 50% Group Presentation (10 min) 20%
Textbook recommendation	None.
Lecture capture	None.
Location	National Chengchi University, Taipei, Taiwan (Subject to change every winter/summer holiday)
Quota	20-25 people (minimum 70% WAM required, subject to change)
Year and semester reviewed	2018 Summer Term

Comments

This is an overseas commerce subject that aims to provide an opportunity for students to gain a better understanding into how business is conducted in the Asia region. The basic idea is for students to spending 2 weeks in a specific Asian country where they will attend classes at a partnering university and visit various local businesses.

Application process

Students who applied for the subject were required to submit their resume and a short 100 word questionnaire. The published WAM requirement is 70% but there were students with a lower WAM on my trip.

Scholarship and costs

Students are required to pay an additional fee on top of their subject fee. It is approximately $2300, which covers the accommodation, university travel insurance and sightseeing expenses. Students will have to pay for their flight tickets separately and food is also not included. For domestic students, the New Columbo Plan (NCP) of around $2700 is available, which will leave students with an additional $500 after paying for the program expenses. For international students, the NCP option is not available. The Melbourne Global Scholars Award of $1000 is also available but students cannot receive both the NCP and the award.

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

Subject content

Information session

An FBE staff member will go through a brief outline of the program including the administration tasks such as your visa, flight tickets and hotel room allocations, and program-related content such as the itinerary. This is a compulsory session and allows you to meet the other students who you will be travelling with. This should go for approximately one hour.

Pre-Departure Briefing

A full pre-departure briefing workshop where students will meet the FBE staff member who will be supervising the trip. They will be travelling with you and may also be marking your assessments. Lunch and snacks were provided.

During the briefing, the details of the trip will be explained to the students. During my pre-departure briefing, there was also a segment to explain the basic local language and culture, which was useful especially for the students who had no prior exposure to the location that the program took place at.

In-country period

The subject will occur over 2 weeks at the selected destination. It aims to expose students to the local business environment as suggested by the name. There are mainly 3 components to the trip; lectures, company visits and travelling.

The FBE will be partnering with a local university. There will be a staff member from the local university who will act as the main contact and organiser for the entire trip. During my trip to Taiwan, Jean, who was a very lovely lady, was in charge of organising the trip and looking after us. There are approximately 2 lectures scheduled every day and they aim to provide students with an introduction to the local business environment, culture and even technical skills. The lectures will be given in English. We had lectures that introduced us to the local industries, businesses, culture and we analysed a historical M&A case.

Company visits are also an important component of the subject as it provides insights into the local businesses and industries. There should be around 2-3 visits per week and a smart casual/business casual dress code is required. Please ensure that you have a set of outfits for company visits (Consult the FBE staff member during the pre-departure workshop). The companies that we visited ranged from a local business that developed hi-tech kitchenware, an innovative NFP recycling plant, a National Museum and a few local businesses. Take as many photos and note down any information as this will also be very valuable during your reflection journal and in deciding the research topic. There will also be tours of local destinations.

Assessment

Reflective Journal: This is a 1000-word personal reflection journal/diary that allows you to reflect on your experiences during the trip. This is suggested to be a diary/personal journal. There is no specific prompt or topics provided. It is recommended to include pictures or diagrams that will assist in your reflection. It is also recommended to write a brief summary at the end of each day as you may forget about some details after the trip.

Research Essay: This is a 2000-word research essay that allows you to research a topic of your choice. The chosen topics needs to be relevant to the business or economy of the country that students travelled to. It is strongly recommended and vital for you to consult with the relevant staff member marking your work to ensure that the topic is approved prior to commencing. As it was still a relatively new subject when I undertook it, there was a lack of structure or restrictions on the

research essay, which equates to greater degree of freedom. It is best to start this essay as early as possible especially for those students who have no previous exposure to the chosen topic. Referencing is also very important so do it well.

Group Presentation: Students are required to form groups of 3-4 students. The topic of the presentation should be able a topic that students have learnt about as part of the trip. The topic of the presentation cannot be the same one that any of the group members have completed their essay on. Plan ahead and ensure tasks are allocated according to the strengths of each group member. Communicate with the professor/staff member who will be marking your work to ensure that you are in the right direction. Rehearse well prior to the presentation and make sure the *presentation is distributed equally amongst group members.*

Concluding remarks

Through the trip, we were able to learn about the business environment of Taiwan. More importantly, we were exposed to the general business etiquettes that are adopted by the locals. These are valuable experiences that students can apply to their future career.

MUSI20149 Music Psychology

Lecturer(s)	Professor Katrina McFerran and various guest lecturers
Weekly contact hours	1 × 2-hour lecture (non-compulsory)
Assessments	10 × weekly quizzes 10 × 4% 2000 word written assignment 60%
Textbook recommendation	Rickard, N. & McFerran, K. (2011). *Lifelong Engagement with Music: Benefits for Mental Health and Well-Being*. Melbourne: Nova Publishers. ✗ I do not believe the textbook is necessary. See 'Necessary Resources' in the body of the review for more information.
Lecture capture	Full (audio and visual).
Year and semester reviewed	2019 Semester 1

Subject content

- Week 1: Overview and Introduction to the Field of Music Psychology
- Week 2: Music in the Prenatal and Postnatal Phases
- Week 3: Music in Schools
- Week 4: Music and Adolescents
- Week 5: Music and Older People & Introduction to Assignment
- Week 6: Music and the Brain
- Week 7: Performance Science
- Week 8: An Overview of Music and Pain
- Week 9: Music and Emotions
- Week 10: Multi-Sensory Perception
- Week 11: Music Performance Anxiety
- Week 12: From Psychology to Evolutionary Theory: Multiple Perspectives on Music and Wellbeing

Music Psychology is a breadth subject that explores research involving the influence of music on the brain and the body across the lifespan. Weeks 2-5 constitute the "lifespan series", considering each stage of the human life, whilst the later weeks look at the specific impacts of music. I found the subject content very interesting and easy to learn. Since all assessment tasks are open-book, there was no pressure to memorise studies or results, which made the subject relatively relaxed.

Lectures

The class registration offered a 9am 2-hour lecture or an "online lecture" – this actually meant that attendance at the on-campus lecture was not compulsory, providing students with the flexibility to watch the lecture whenever convenient. All of the lectures had full audio and video lecture capture recordings, so watching at home covered all the content. Some of the lectures had audience participation activities, such as Poll Everywhere or even singing, so attending the lecture in person could also be quite fun.

At the start of the semester, it was announced that lecture slides would only be released at the discretion of the lecturer, but

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

they would still be captured on lecture capture if not provided. Luckily, all PowerPoint presentations were made available to us. Since the subject is taken by many lecturers, the slides varied in length, amount of detail and amount of literature discussed.

Professor Katrina McFerran, the subject coordinator, took 3 lectures and the rest were taught by guest lecturers (1 guest lecturer for each of the remaining 9 weeks). Katrina was an extremely passionate and engaging lecturer – I could feel her enthusiasm even through the lecture capture. All of the guest lecturers were leading researchers in their respective fields and had interesting research to share, but I can't say they were all as engaging as Katrina was. I found Dr Tan-Chyuan Chin's lecture on 'Music and Emotions' particularly captivating as it explored different models of how music impacts our emotions.

Weekly Quizzes

There were 10 multiple-choice quizzes that tested content from Week 2 to Week 11. The quizzes had 4 questions each, with each question worth 1% of the final grade. They were open for a week for a single attempt and answers would be released shortly after they closed.

The quizzes mostly tested content from the lectures – initially it was often possible to Ctrl+F in the lecture slides but in the second half of the semester the questions became slightly harder and required watching of the lectures. The questions were generally quite straightforward. However, during this semester, there were 2 questions that were somewhat ambiguous. After the answers were released and students pointed this out, they removed the questions and re-weighted the remaining questions. Overall, the quizzes are an easy way to guarantee 40% (or nearly 40%) of the total marks for the subject.

Written assignment

The final assessment was a 2000-word written assignment worth 60%. It was introduced in Week 5 and due during SWOT-VAC (and later extended to the first day of the exam period as university policy does not allow for due dates during SWOT-VAC). The assignment topic was the impact of personal music use on cognition and emotion, and required both personal reflection and analysis of relevant literature.

Only content from Weeks 3, 4, 6, and 9 were directly relevant for the assignment, so there was no need to wait until after the semester finished to begin working on it, which meant there was sufficient time to complete the assignment. Additionally, the assignment was split into 4 parts, with a recommended word count for each section, so although I hadn't written any long essays since high school, I found it easy to reach 2000 words. It was not required to source academic literature outside of what had been provided through lectures and required readings, but I still found my own sources to ensure that my evidence was relevant and current.

In order to provide students with an idea of what was expected, we were provided with the marking rubric, FAQs, extracts of sample answers and an optional on-campus tutorial. I found the sample answers really useful as they indicated the required balance between personal reflection and research literature.

Necessary Resources

The required textbook was Rickard, N. & McFerran, K. (2011). Lifelong Engagement with Music: Benefits for Mental Health and Well-Being. Melbourne: Nova Publishers, which was available as an e-book from the university library website. It could also be purchased hardcopy for those who prefer physical books. Other essential or additional readings were articles that were available either through the university library or shared as PDFs on the LMS.

For the first few weeks, I completed the readings before watching the lectures and completing the weekly quiz. I found that the reading often overlapped with the lecture content so it was unnecessary. Thus, I don't believe it was necessary to

complete the readings to do well in the subject, but the resources were free and easily accessible so they could provide extra support.

Concluding Remarks

Music Psychology was a really interesting subject that allowed me to take a break from the challenges of Actuarial Studies. I believe it will also help to boost my WAM since I have already guaranteed myself a lot of marks through doing well in the weekly quizzes. I highly recommend it as a breadth subject for anyone who enjoys listening to music, playing music or is just interested in the psychology of music.

MUSI20150 Music and Health [SM2]

Lecturer(s)	Dr. Lucy Bolger Dr. Jennifer Bibb Prof. Katrina Skewes McFerran Various (Different lecturer for each week)
Weekly contact hours	1 × 2-hour lectures (non-compulsory)
Assessments	10 × weekly quizzes 10 × 5% Final assignment 50%
Textbook recommendation	None.
Lecture capture	Full (audio and visual).
Year and semester reviewed	2018 Semester 2

Comments

Music and Health is a good second-year bludge subject, especially if you enjoyed *Organisational Behaviour*. It has no attendance requirements and can be completely purely online. The only marks come from the weekly quizzes and a final 2000-word essay due at the end of the semester. With decent accountability and willingness to put up with music as a subject, MUSI20150 is the go-to second-year bludge subject with an easy H1. Expect to spend about 30 minutes a week on quizzes and 3-4 hours at the end of the semester for the final assignment.

Lectures

Lectures for MUSI20150 are redundant to such an extent that when you register for the classes, it says something along the lines of: "if you don't get a lecture time, don't worry, it doesn't matter, just watch lecture capture." The only times I did watch the lectures was for the weekly quizzes, where the lecturer would indirectly give the answer to each question. The problem with this is that the lecture slides often don't give sufficient information for the quizzes, so you will have to sift through the lecture capture. Just watch the lectures online if you feel the need to. Don't attend unless you're willing to sing and participate in some "musicking", as MUSI20150 coins.

Quizzes

The weekly quizzes have 5 questions each, for 10 weeks, where each question is worth 1% of your final grade. This makes each incorrect question quite costly, so I would highly recommend taking this subject with a group of friends. My Music and Health subject score was lower than it should've been because I missed two quizzes, and hence lost 10% stupidly. You generally won't find any answers by googling online, so I would highly recommended that you skip selectively through the lecture capture until you find the phrase spoken by the lecturer that leads you to the right answer, or just watch the lecture.

Final assignment

There is a 50% essay due at the start of SWOTVAC, which has a word limit of 2000 words. This essay requires you to create a playlist of ten songs or pieces from any mix of genres, rearranged in a certain order that enhances your physical

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

or mental health, whilst alluding to music theories and concepts taught during the semester. You will need at least six scholarly references throughout. The essay itself isn't hard and you should expect to take around 2-4 hours towards the end of the semester to complete it.

MUSI20163 Samba Band [SM1]

Lecturer(s)	Mr Alex Pertout Mr Salvador Persico Mr Ryan Menezes	
Weekly contact hours	1 × 2-hour practical	
Assessments	500 word research on a percussion instrument Final group performance Classroom participation	15% 35% 50%
Textbook recommendation	None.	
Lecture capture	None. A video is filmed after every practical for you to practice at home.	
Year and semester reviewed	2019 Semester 1	

Subject content

- Week 1 Introduction: styles, techniques, pulse, counting, hand to hand
- Week 2 Ensemble: Rhythmic Styles I
- Week 3 Ensemble repertoire rehearsals / basic development of the various parts
- Week 4 Continuation of ensemble development - Discussion on Individual Test in week 6
- Week 5 Ensemble: Rhythmic Styles II - Discussion on Individual Test in week 6
- Week 6 Individual Test - All parts and instruments covered weeks 1-5 (no mark is assigned)
- Week 7 Continuation of ensemble development
- Week 8 Ensemble: Rhythmic Styles III
- Week 9 Ensemble repertoire rehearsals / basic development of the various parts
- Week 10 Continuation of ensemble development
- Week 11 Rehearsal and preparation for formal performance assessment or studio recording
- Week 12 Final rehearsal and preparation for formal performance assessment or studio recording

Samba Band is a breadth subject that provides participants an opportunity for an in-depth practical study of percussion techniques and repertoire. The material is based on African derived drumming which over the centuries has continued to develop and flourish on the American continent. Classes will cover techniques on a variety of percussion instruments, the role of the various instruments in the ensemble, background and selected improvisation styles. The ensemble will prepare and rehearse both conducted and unconducted material that is suitable for public performance or recording. In general, this subject is very relaxing and chilled.

Practicals

I had Salvador Persico as my tutor. He engages the class very well and made the learning experience very enjoyable. You will learn about two ensembles in this subject and there is a brief introduction given during the first week. On that, you will learn how to read music notes that are needed in this subject, which means having a musical background is not a prerequisite. However, a basic background in music and rhythmic awareness will help you to ace this subject.

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

There will be an individual test in week 6 at your normal practical covering some of the instruments that you learned in the first 5 weeks. No marks are assigned to this test but it does give your tutor an idea on your performing ability, which may affect your marks on weekly participation. The second ensemble is relatively harder. The best advice I can give you is to print the music sheet out before the practical. It would be much easier to follow when you have a hard copy.

The classroom participation is 50% of the assessment and is marked based on your weekly performance and discussion. 5 students will be selected or volunteer to be recorded at the end of the practical for the class to practice at home. If you are one of those top 5 students in every video, you are certainly doing very well in this subject. There is also a hurdle requirement of at least 80% attendance to these classes.

Final group performance

The final group performance occurs in the last practical in week 12 which forms 35% of your final mark. Your tutor will record the performance and watch the video many times to assess you as an individual. It will be hard to play every note correctly so some practice will be needed for the final performance. However, don't worry too much if you make mistakes as most students will.

Unfortunately, you do not get to take any instruments home, but a good way to practise is by listening to the video recording after class and practise the pattern on your lap, mimicking how you would perform your percussion instrument.

500 word research paper

The research paper should incorporate historical research on a particular percussion instrument, a description of its playing techniques, broad use in traditional and popular settings and include information on particular recordings the participant has analysed that incorporate and/or feature this particular instrument. The paper will be submitted in hard copy at the last class of the semester, week 12. As is the case with all academic essays, it should incorporate a sizeable bibliography and footnotes outlining the research material gathered. I would say this paper was quite easy to complete as it's not marked as strictly as in other subjects.

Concluding Remarks

The total time commitment of Samba Band is 96 hours while it is 170 hours for an ordinary actuarial subject as suggested in the handbook. From my personal experience, I spent 2 hours on the essay and maybe 6 hours in total on practice across the semester. So, if you do the math, I only spent approximately 32 hours (including practicals and time spent practising) on this subject for the whole semester. This gave me more time to focus on my actuarial subjects. In terms of whether it is a WAM booster or not, I would say it is quite a subjective subject as your final mark is highly dependent on what your tutor thinks about your performance. To conclude, considering the amount of work that is required for actuarial subjects, I would highly recommend this subject to all actuarial students as it makes you feel like you are under loading. It was also the most enjoyable subject I've ever taken.

SCIE20001 Thinking Scientifically [SM2]

Lecturer(s)	Professor Andrew Drinnan
Weekly contact hours	None — Online Subject 1–2 hours of lectures every week depending on the content.
Assessments	3 online quizzes (due at the end of mid-semester break) 16.7% total 4 module assignment tasks due in Weeks 4, 6, 8, 12 16.7% each Take-home exam due in the first week of exams 16.7%
Textbook recommendation	None.
Lecture capture	Full (both audio and video) — Online lectures
Year and semester reviewed	2019 Semester 2

Comments

I initially selected this subject with the hopes of *boosting my WAM*; overall, this subject is quite straight forward, and I was able to achieve my objective. As I studied this subject, I found the content to be quite interesting as it allowed me to *think more scientifically* and be able to view issues from a different and broader scope. It is quite interesting as the content and articles prescribed were all surrounding the latest scientific and technological trends.

Subject content

There are a total of 4 modules in the course:

- Science Communication
- Science Observation
- Thinking with Data
- Science in the Media

Science Communicate and Observation were the most straightforward sections within the course while Thinking with Data was the hardest and most challenging (do not under-estimate this topic).

Science Communication

This is the first topic, and it starts simple and straight-forward. Students are required to write two blogs to communicate scientific ideas with simple terms. It is best to understand these ideas fully before then writing it in your own words, rather than direct paraphrasing. This will allow your blogs to flow naturally and prevent it from sounding too *science-y*. The main focus is *simplicity*, which means if you can keep it simple, then it will be good! Students were not restricted to academic journals and were provided with a greater degree of freedom to gather information.

Science Observation

In this topic, we were taught how to observe and make unbiased decisions with scientific topics. The assessment is based on the famous Australian painting *Shearing the Rams*, by Tom Roberts. Students were required to write an observational essay describing the piece, that allows others to replicate the image without seeing it or having any prior knowledge of it. This was quite tricky, especially for students without any background in analysing paintings. It is recommended for students to research how to write a painting analysis before writing. The painting should be analysed for its visual aspects, complemented with interpretations of any meanings behind it.

Thinking with Data

In comparison with the other areas of studies, this topic was the most challenging. This topic was divided into several subsections, which included statistics, graphics, p-tests, and tables. The assignment questions required an in-depth understanding of the topics as each quiz tested a different aspect within the topic. The final assignment involved the creation of a PowerPoint explaining the Lamarckian theory based on a set of sample raw data provided in Excel format. Students are required to make graphs combined with explanations to explain your findings/conclusions in this module.

Science in the Media

The main focus of Science in Media is to discuss how science is presented in the general media. There are discussions of common issues such as factual factors, over-simplification and incorrect statistics interpretation. The biases within the media are also discussed by the lecturer to allow students to have a better understanding when reading various scientific articles in the press. There are two parts within this module: part A and part B. Within part A, students are required to read 10 different online science articles and identify which biases are present within the reports. Students are also required to write a reference for one of the sources within the articles. For part B, students were required to write a scientific essay based on the original study within one of the ten articles.

Take-home Exam

The take-home exam was a 1000-word response paper, due to be submitted online during the first week of the exam period. The students were provided with four different articles about the recent development of quantum computing to read. Students were required to analyse the articles critically and write an essay in response to the information that they have learned. Students should identify the respective intentions behind each article before writing. Essentially, this is testing the students' reading comprehension and the ability to sort through large blocks of information effectively. It was relatively easy, and it took me approximately 2 days to finish the essay.

Concluding Remarks

This subject was quite enjoyable as it has allowed me to learn many interesting facts about various scientific topics. The time commitment of this subject is much lower than other subjects, so get on it if you have a spare breadth!

Appendix

New Foundation Program

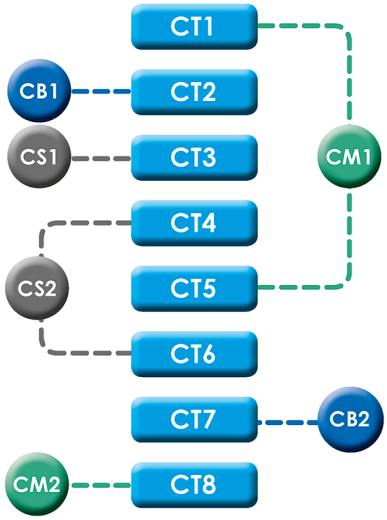
Beginning in 2019, the actuarial studies curriculum transitioned from its previous *Part I Program* to the new *Foundation Program*; changing the 8 Core Technical subjects (CTs) to 6 Core Principle subjects under three main modules (CS *Actuarial Statistics*, CM *Actuarial Mathematics*, CB *Business*). Although this change will take place at the University of Melbourne in 2020, the transition period will affect all new students beginning in 2019 and all students who will be undertaking actuarial exemption subjects in 2019.

For students who already have successfully completed a number of exemptions with the old *Part I Program*, these exemptions can be claimed and paid for through the Actuaries Institute website for $300 per exemption. Note that for Foundation exemptions CM1 and CS2, which have two applicable subjects in *Part I* (CT1 & CT5 and CT4 & CT6, respectively), students need to have obtained both *Part I* exemptions to obtain the *Foundation Program* exemption. For example, if you have obtained CT1 *Financial Mathematics* by the end of 2018, but not CT5 *Contingencies*, do not apply and pay for the CT1 exemption as this will not contribute towards CM1. This notion is expanded upon at https://www.actuaries.asn.au/studying-with-the-institute/foundation/exemptions.

For the purpose of this subject review, the exemption status indicated for each subject will continue to refer the old *CT* subjects until the transition has been completed in 2020.

Please feel free to contact the Actuarial Students' Society for more information or clarification on the *Foundation Program*.

The mapping of the old *Part I* exemptions to the new *Foundation Program* exemptions is outlined in Figure 1.



Foundation subject	Part I subject
Foundation	***Part I***
CS1 Actuarial Statistics 1	CT3 Probability and Mathematical Statistics
CS2 Risk Modelling and Survival Analysis	CT4 Models CT6 Statistical Methods
CM1 Actuarial Mathematics 1	CT1 Financial Mathematics CT5 Contingencies
CM2 Financial Engineering and Loss Reserving	CT8 Financial Economics
CB1 Business Finance	CT2 Finance and Financial Reporting
CB2 Business Finance	CT7 Business Economics

Figure 1: Transition to Foundation subjects

List of Core Technical Exemptions [1]

Table 1: Actuaries Institute Core Technical exemption subjects and corresponding university subjects

	Exemption subject	University subject(s)	
Part I			
CT1	Financial Mathematics	ACTL20001	Financial Mathematics I
		ACTL20002	Financial Mathematics II
CT2	Finance and Financial Reporting	ACCT10002	Introductory Financial Accounting
		FNCE10002	Principles of Finance
CT3	Probability and Mathematical Statistics	MAST20004	Probability
		MAST20005	Statistics
CT4	Models	ACTL30001	Actuarial Modelling I
		ACTL30002	Actuarial Modelling II
CT5	Contingencies	ACTL30003	Contingencies
CT6	Statistical Methods	ACTL30004	Actuarial Statistics
		ACTL40002	Risk Theory I
CT7	Business Economics	ECON10004	Introductory Microeconomics
		ECON20001	Intermediate Macroeconomics
CT8	Financial Economics	ACTL30006	Financial Mathematics III
		ACTL40004	Advanced Financial Mathematics I
Part II			
Part IIA	The Actuarial Control Cycle	ACTL40006	Actuarial Practice and Control I
		ACTL40007	Actuarial Practice and Control II
Part IIB	Investment and Asset Modelling	ACTL40009	Actuarial Practice and Control III

Source: *Centre for Actuarial Studies* and the *Actuaries Institute*
Current as of 11th December 2019.

[1] As the Actuaries Institute has commenced the implementation of changes to enhance the actuarial education program, 2019 is the last year for the University to offer the previous CT1–CT8 subjects program. Please see the new exemption subjects for the implemented *Foundation Program*.

List of Core Principle Exemptions

Table 2: Actuaries Institute Core Principle subjects and corresponding university subjects

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

Source: *Centre for Actuarial Studies* and the *Actuaries Institute*
Current as of 11th December 2019.

Equivalent Graduate Subjects

Subjects offered as part of the 2-year MC-ACTSCI *Master of Actuarial Science* or 1.5-year MC-COMACSC *Master of Commerce (Actuarial Science)* degrees 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 the BH-COM *Honours* program, we have listed graduate actuarial subjects with their undergraduate counterparts below. Whilst we continue to accumulate reviews from graduate actuarial subjects, the reviews for undergraduate subjects included in the *Actuarial Students' Society Subject Review* will serve as an accurate reference of the content in the corresponding graduate subjects.

Some of these graduate actuarial subjects will share the same lectures as their undergraduate counterparts, as in Table 3. Others will just contribute to the same exemption subject as their undergraduate counterparts (and hence have common content), as in Table 4 and Table 5.

N.B. To avoid confusion, these tables will continue to reference the *CT* subjects; this will be updated in the next *Actuarial Students' Society Subject Review* to accompany the arrival of the *Foundation Program* and the termination of the *CT* Program.

Table 3: 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
ACTL90009	Actuarial Practice and Control III	ACTL40009	Actuarial Practice and Control III
ACTL90013	Actuarial Studies Projects	ACTL40010	Actuarial Studies Projects Part 1
ACTL90013	Actuarial Studies Projects	ACTL40011	Actuarial Studies Projects Part 2

Table 4: Graduate and undergraduate actuarial subjects with common CT exemption subjects

	Graduate subject	Undergraduate subject
CT1	ACTL90001 Mathematics of Finance I	ACTL20001 Financial Mathematics I ACTL20002 Financial Mathematics II
CT2	ACCT90004 Accounting for Decision Making FNCE90060 Financial Management FNCE90018 Corporate Financial Policy	ACCT10002 Introductory Financial Accounting FNCE10002 Principles of Finance
CT3	Both undergraduate and graduate courses complete MAST20004 Probability and MAST20005 Statistics	
CT4	ACTL90006 Life Insurance Models I ACTL90007 Life Insurance Models 2	ACTL30001 Actuarial Modelling I ACTL30002 Actuarial Modelling II
CT5	ACTL90005 Life Contingencies	ACTL30003 Contingencies
CT6	ACTL90008 Statistical Techniques in Insurance ACTL90004 Insurance Risk Models	ACTL30004 Actuarial Statistics ACTL40002 Risk Theory I
CT7	ECON90015 Managerial Economics ECON90032 Macroeconomics for Managers ECON90047 Macroeconomics 2	ECON10004 Introductory Microeconomics ECON20001 Intermediate Macroeconomics
CT8	ACTL90002 Mathematics of Finance II ACTL90003 Mathematics of Finance III	ACTL30006 Financial Mathematics III ACTL40004 Advanced Financial Mathematics I
Part IIA	ACTL90010 Actuarial Practice And Control I ACTL90011 Actuarial Practice and Control II	ACTL40006 Actuarial Practice and Control I ACTL40007 Actuarial Practice and Control II
Part IIB	ACTL90009 Actuarial Practice and Control III	ACTL40009 Actuarial Practice and Control III

Table 5: Graduate and undergraduate actuarial subjects with common CP exemption subjects

	Graduate subject	Undergraduate subject
CS1	ACTL90001 Mathematics of Finance I ACTL90005 Life Contingencies	ACTL20001 Introductory Financial Mathematics ACTL30003 Contingencies
CS2	ACTL90021 Topics in Insurance and Finance ACTL90002 Mathematics of Finance II ACTL90003 Mathematics of Finance III	ACTL20004 Topiocs in Actuarial Studies ACTL30006 Intermediate Financial Mathematics ACTL40004 Advanced Financial Mathematics
CM1	Both undergraduate and graduate courses complete MAST20004 Probability and MAST20005 Statistics ACTL90008 Statistical Techniques in Insurance	ACTL30004 Actuarial Statistics
CM2	ACTL90006 Life Insurance Models I ACTL90007 Life Insurance Models II ACTL90019 General Insurance Modelling	ACTL30001 Actuarial Modelling I ACTL30002 Actuarial Modelling II 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 ACTL90011 Actuarial Practice and Control II	ACTL40006 Actuarial Practice and Control I ACTL40007 Actuarial Practice and Control II
DAP	ACTL90019 Data Analytics in Insurance II	ACTL40012 Actuarial Analytics and Data II

Subject Review Index

This section and the following Tables serve as an index for each subject review across all the different editions of the *Actuarial Students' Society Subject Review*. Blue numbers indicate a new review for that edition and *asterisks** represent an 'equivalent' undergraduate subject review for a graduate subject.

Legend			
1	Semester 1	J	July Intensive
2	Semester 2	A	All Year
S	Summer Term	O	Other
W	Winter Term		

Table 6: Core Subjects

Subject Code	2015	2016			2017		2018		2019		2020	
	Start	Start	Mid	End	Mid	End	Mid	End	Mid	End	Mid	End
First-Year Subjects												
ACCT10001		1	1	1	1	1	1	1	1	1		
ACCT10002		2	2	2	2	2	2	2	2	2		
ACTL10001	2	2	2	2	2	2	2	2	2	2		
ECON10003		2	2	2	2	2	2	2	2	2		
ECON10004	1	1	1	1	1	1	1	1	1	1		
FNCE10002					1	1	1	1	1	1		
MAST10006		1	1			1	1	1	1	2, 1		
MAST10007			S	S		2	2	2	1	1		
MAST10008	1	1	1	1	1	1	1	1	1	1		
MAST10009	2	2	2	2	2	2	2	2	2	2		
Second-Year Subjects												
ACTL20001	1	1	1	1	1	1	1	1	1	1		
ACTL20002	2	2	2	2	2	2	2	2	2	2		
ECON20001	2	2	2	2	2	2	2	2	2	2		
MAST20004	1	1	1	1	1	1	1	1	1	1		
MAST20005	2	2	2	2	2	2	2	2	2	2		
MGMT20001		2	S, 2	S, 2	S, 1	1	1	1, 2	S	S, 1, 2		
Third-Year Subjects												
ACTL30001	1	1	1	1	1	1	1	1	1	1		
ACTL30002	1	1	1	1	1	1	1	1	1	1		
ACTL30003	2	2	2	2	2	2	2	2	2	2		
ACTL30004	2	2	2	2	2	2	2	2	2	2		
ACTL30005	2	2	2	2	2	2	2	2	2	2		
ACTL30006	1	1	1	1	1	1	1	1	1	1		
Honours Subjects												
ACTL40002		1	1	1	1	1	1	1	1	1		
ACTL40003				2	2	2	2	2	2			
ACTL40004		1	1	1	1	1	1	1	1	1		
ACTL40006		1	1	1	1	1	1	1	1	1		
ACTL40007						2	2	2	2	2		
ACTL40009				2		2	2	2	2	2		
ACTL40010						A[2]	A	A	A	A		
ACTL40011						A	A	A	A	A		
Masters Subjects												
ACTL90001						1	1	1	1	1		
ACTL90002						2	2	2	2	2		
ACTL90003					1*	1*	1*	1*	1*			
ACTL90004					1*	1*	1*	1*	1*			
ACTL90005								2	2	2		
ACTL90006							1	1	1	1		
ACTL90007								2	2	2		
ACTL90008								2	2	2		
ACTL90009					1	1, 2*	1, 2*	1, 2*	1, 2*	1		
ACTL90010					1*	1*	1*	1*	1*			
ACTL90011						2*	2*	2*	2*	2		
ACTL90013				A*	A	A*	A	A*	A			
ACTL90014				2*	2*	2*	2*	2*	2*			
ACTL90018							1	1	1			
ECON90015										2		
ECON90047									1	1		
FNCE90018										2		
FNCE90060									1	1		

[1] Review relabeled from ACTL40005/ACTL90013 to ACTL40010/ACTL40011 due to a restructuring of subjects in 2017.

Table 7: Past Core Subjects, Breadths and Electives

Subject Code	2015	2016			2017		2018		2019		2020	
	Start	Start	Mid	End	Mid	End	Mid	End	Mid	End	Mid	End
Past Core Subjects												
FNCE20001	2	2	2	1								
ACTL40005				A	A							
ACTL40008		2	2	2	2	2	2	2				
ACTL90015					2*	2*	2*	2*				
Breadths and Electives												
AGRI20030				J								
BLAW10001		1	1					2	2	2		
BLAW20001		1	1									
CHIN20026					2	2						
COMP10001			1	1			1	1	1	1		
COMP20005		2	2		1	1	1	1	1	1		
COMP90038								2		2		
ECOM30004								2		2		
ECON20002		1	1	S	S		1	1	S	S		
ECON20005				2	2		1					
FNCE10001			1									
FNCE20002								2	2	2		
FNCE20005							1	12	1	1		
FNCE30007		2	2		1	1						
GERM10008		1	1									
IBUS20007								S	S	S		
JAPN10001			1	1			1	1				
MAST20022				2	2	2						
MAST30020			1	1								
MAST90082					1	1	1	1	1			
MGMT30006				2								
MGMT30017				W[1]	W[1]	J[2], J[3]	J[2], J[3]					
MUSI20149				1	1				1	1		
MUSI20150								2	2	2		
MUSI20163									1	1		
MUSI20168				1	1							
SCIE20001						2	2			2		

[1]MGMT30017 in Seoul
[2]MGMT30017 in Berlin
[3]MGMT30017 in Shanghai