SUBJECT REVIEW

2018 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.

In the 2018 end-of-year edition of the *Actuarial Students' Society Subject Review*, 10 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.

Due to the change to the *Bachelor of Commerce* structure in 2017, actuarial students must now take one level–2 commerce elective. With this in mind, a focus for the 2018 end-of-year edition of the *Actuarial Students' Society Subject Review* was to include 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.

More importantly, the existing ***Part I*** program changing to the new ***Foundation Program*** is an important transition that should be carefully scrutinised by students starting the *Bachelor of Commerce* actuarial stream in 2019 and for those who are undertaking exemption subjects in 2019. Please read the 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.

New Foundation Program

Beginning in 2019, the actuarial studies curriculum is changing from its previous *Part I Program* to the new *Foundation Program*, in addition to changing its 8 Core Technical subjects (CTs) to 6 Core Principle subjects. This change affects 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 $100 per exemption (this will increase to $300 per exemption from May 2019!). 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/part-i.

The mapping of the old Part 1 exemptions to the new Foundation Program exemptions are outlined in the following table:

Table 1: Transition to Foundation Program

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

Feel free to contact the Actuarial Students' Society for more information or clarification.

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

Acknowledgements

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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.

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* (CT2 *Finance and Financial Reporting* subject).
Lecturer(s)	Mr Noel Boys
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. All students enrolled in the subject have **free access** to the e-text through the LMS for the entire semester.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2018 Semester 1

Comments

Lectures

- Week 1: Regulatory Framework / Conceptual Framework;
- Week 2: Transaction Analysis & Financial Statements;
- Week 3: The Balance Sheet — Assets;
- Week 4: The Balance Sheet — Liabilities;
- Week 5: The Statement of Comprehensive Income & Statement of Changes in Equity
- Week 6: The Cash Flow Statement
- Weeks 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

If you have never done accounting before, do not be afraid! It is safe to say that you are definitely not the only one. As a matter of fact, the lecturer does take a moment in the introductory lecture to highlight that completion of VCE accounting

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

prior to this subject will not provide you with any advantage whatsoever. In turn, it is the students that did VCE accounting who generally struggle, as the concepts and presentation format of the financial statements differ to what was being taught in VCE.

The first lecture provided an introduction to accounting and the main purpose it provides to users. As an introductory lecture it was quite dry and text heavy which made the subject my least favourite to look forward to at that point in time. However, do not fret, I can guarantee you that it does gradually become more interesting! In my personal opinion, I would highly advise students to understand the Conceptual Framework; how it provides accountants with choices, estimates and judgements and how those choices, estimates and judgements impact the resulting financial statements relayed to users. You will definitely see a recurring importance of this concept through-out the subject.

The second lecture illustrates how to analyse and record individual business transactions and events, and how that information is translated into other financial statements explored in weeks 3 – 6. In the following weeks, Noel explores the key elements of accounting and the definition and recognition criteria of each as defined by the Conceptual Framework. Lectures 7 and 8 is where the information recorded in financial statements will be transformed into ratios used for interpretation of an entity's financial position and performance. You are highly recommended to understand these ratios as they play a significant importance in analysing an entity's financial statements in Assignment Two. Noel emphasises that you are not examined on your memory of citing the definitions but your understanding (which I can highly attest to). This includes learning how to observe, interpret and even illustrate any of the financial statements in the exam.

Lectures 9 and 10 focuses solely on management accounting which do require a number of calculations that are predominantly straightforward. The subject concludes with a guest lecturer in week 11 who introduces the topic of sustainability — how that has been significantly adopted by many organisations and how that has impacted and translated into their financial statements.

There are instances where the lecturer does turn off the lecture recording, especially near the end-of-semester, to provide the students with tips on the exam. Therefore, to ensure that you do not miss out, make sure you make the effort to at least attend the last few lectures.

Overall, the subject is definitely heavy content and more often boring than stimulating, to say the least. Nonetheless, Noel Boys will guarantee to make you rethink even for a split second during the lecture that the subject is tolerable with his great and witty sense of humour.

Textbook

The textbook was personally very useful in clarifying the material in more detail as it provided numerous examples with every concept. It does provide further insight into areas that are beyond the scope of the learning objectives thus, do highly refer to the nominated prescribed readings given for each lecture. Although it is expected that the readings are completed prior to the lectures, I did not find this mandatory to my learning. However, I do highly recommend reading the textbook as it was mentioned that there are concepts within the reading that are examinable.

Tutorials

Preparation and attendance of tutorials are the easiest marks you would ever obtain from this subject, so it is highly recommended to do so. From my experience, I have discovered that the presentation and structure of the tutorials do differ according to the tutor. If you have found that your tutor's explanations do not align with your own learning, do not be afraid to branch out to other tutorials. Just make sure you do so before it is too late!

As for my own tutor, she would start off the tutorial with a recap of the concepts that were introduced during the lecture. From there, we would move onto tasks that were completed as a group of 3–4 followed by a class discussion. The discussion was extremely useful in providing examples of how we would answer potential questions relating to the concepts learnt. Depending on the tutor, you are also assessed for your participation within the tutorial so be sure to speak up!

Assignments

Assignment one is an individual assignment divided into two parts accumulating to 10% of your grade. Part A focuses on the preparation of a transaction worksheet on an Excel spreadsheet (demonstrated in week 2) given by a list of business transactions and events conducted by an entity. The template is provided thus, only insertion of the values into each cell is required. Every student is presented with a different set of information to ensure that no collusion is conducted. Following submission of Part A, a **corrected** worksheet is given for you to prepare a Balance Sheet and Statement of Income. Although the assignment is relatively straightforward, I put emphasis on triple-checking the values you have inserted into each cell as well as the presentation of the statements (as your marks are greatly deducted for this criteria).

Assignment two is a group assignment divided into two parts accumulating to 10% of your grade. Part A requires students to work in groups of 3–4 where a set of financial statements on Excel is provided for you to calculate a set of ratios and conduct trend analysis (refer to lectures 7 and 8). I recommend every student to complete this task individually and, in the end, use your solutions as a comparison to your other team members. Not only does this help to check the answers, it also highlights any gaps within your knowledge. After submission, you are to complete a quiz of 12 questions as a group regarding the Excel spreadsheet you have completed. Some of the questions involved figures directly from the worksheet whilst others required interpretation and understanding of the ratios. In terms of Part B, you are given a set of financial statements of an illustrated entity, and you are to evaluate their financial performance and position by highlighting three main concerns in an internal memorandum.

Online Tests

As part of your tutorial preparation, there are online quizzes that need to be completed prior to each tutorial. Although the marks of the quiz are non-assessable, completion of the quiz provides an indication of your preparation of the tutorial. Throughout the semester, there are 4 assessable quizzes worth 1% each that are generally open to students on Friday 4pm till Sunday 4pm for the according week. Majority of the questions are sourced from the textbook so be sure to attempt those first!

End of Semester Exam

Overall, there is definitely a mixture of arithmetic and theory-based questions. However, as noted above, the exam is entirely about your depth of understanding rather than your reliance on memory. In my experience of the exam, I found that there is quite an emphasis on the preparation of financial statements — Balance Sheet, Income Statement and Cash Flow Statement. Other than that, you are given a number of scenarios where you are required to apply your knowledge of the accounting elements to answer them. If you are wondering, Noel did mention that you do not have to remember the formulas of the ratios as relevant ones are provided to you in the exam.

Concluding Remarks

Although this subject was far from my favourite, I have learnt to appreciate the concepts being taught as I have found that it is applicable to understanding the terms that I come across on a daily basis. It might not be your favourite either but at least we can all come together and agree how much of a gem Noel has been!

ACCT10002 Introductory Financial Accounting [SM2]

Exemption status	CT2 *Finance and Financial Reporting*, in conjunction with FNCE10002 *Principles of Finance* or FNCE20001 *Business Finance*. An average of 73 across this subject and one of • FNCE10002 *Principles of Finance* • FNCE20001 *Business Finance* is needed, with no fails.
Lecturer(s)	Mr Warren McKeown
Weekly contact hours	1 × 2-hour lecture 1 × 1-hour tutorial
Assessments	Tutorial attendance and participation 4% Online quiz 2 × 3% Practice set assignment Part 1 5% Practice set assignment Part 2A 7% Practice set assignment Part 1 8% 3-hour end-of-semester exam (hurdle) 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. Readings, and hence textbooks, are not necessary in my opinion, although they can be a good reference if you are struggling to understand a concept. I have never had to use it as the lectures and tutorial work were detailed enough.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2018 Semester 2

Comments

Subject content

One week per dot point:

- Introduction, Conceptual Framework, External Reporting
- Double Entry Recording
- Accrual Accounting, Adjustments
- Inventories
- Receivables
- Non-Current Assets
- Liabilities
- Equities
- Share Issue/Change in Equity
- Statement of Cash Flows

- Accounting for GST
- Revision/Course Review

ACCT10002, also known as Introductory Financial Accounting, or IFA for short, can be thought of as an extension from *Accounting Reports and Analysis*, with more emphasis on financial accounting, as the name suggests. This may be the subject where your VCE Accounting background comes in handy, as there is a heavy focus on double entry (debit/credit) accounting processes behind preparing a set of financial statements. However, not having prior knowledge on this concept is not an issue, as it is thoroughly taught during the first week or two, and even if you don't fully grasp it then, the countless exposure to the process throughout the semester will ensure that you are comfortable with the idea.

Lectures

Lecture slides are uploaded on LMS the week before and unlike most other lecturers, Warren uploads the fully completed slides from the beginning, so if you really cannot be bothered to go to a lecture or watch it, purely reading the slides will still provide you with the same information. He also uploads the completed versions of any worksheets that are covered during the lecture, which can be accessed through LMS at the end of the week. However, note that not watching the lectures may hinder your understanding of the new concepts, especially if you're unfamiliar with the double entry system, so I would definitely recommend watching them. Warren usually finishes his lectures almost half an hour early, and he speaks very slowly so if you lecture capture at $\times 1.5$ or even $\times 1.75$ speed, it takes only an hour or so to finish the lecture. I think it's worth the investment.

Tutorials

Tutorial participation and attendance is an easy way to guarantee 6 % of your total mark. It is a bit less than your usual 10% tutorial mark, but hey 6% is still something. Your tutor will assess your participation and attendance, which results in a final mark out of 6. Honestly speaking, as long as you make an effort to contribute during class and attend them, they are easy marks. Asking questions is a simple way to demonstrate to the tutor that you are attentively participating.

Whilst there was pre-tutorial work which was "required" to be completed each week, my tutor never checked it, and I rarely did it (yet still managed a 6/6), so the prior work is not essential as far as your tutorial marks are concerned . However, your tutor will most likely go through these questions or request the class to complete certain tasks as a group, so having done these questions prior to the tutorial will help with your understanding and assist you to contribute more for that 6/6 tutorial mark.

Answers for the questions are uploaded on LMS at the end of each week. Your tutor will not go through every single question, so it is crucial that after doing the questions, you check your answers.

Assignments and Assessments

Assignment Part 1 was an exercise that comprised of reading and comprehending a set of information, given in the form of invoices, and preparing a statement of financial position and financial performance. This had to be done manually through Excel, which was new to some people, and there were several hidden twists and tricks , so it was crucial that you did not rush this assignment. This was worth 5% of the total mark.

Assignment Part $2A$ was an extension from Part 1, with the difference being that it was done through Xero, which I thought was much quicker and easier than using Excel. A few of my friends said it was harder because they were not familiar with Xero, but I believe that in addition to Google, there were plenty of resources. This was worth 8%.

Assignment Part $2B$ was a short written assessment in which you had to discuss the cost method of a given business. Personally, it was the hardest one, not because it was difficult to do, but because it was hard to see what was expected. However, they give you a chance to submit a draft to receive concise feedback, so I strongly recommend that you do this in order to get an idea of what you're supposed to write.

Other Resources

I completed the subject without the textbook, and I can confidently say that it is not necessary. As previously mentioned, it can be a good reference. Unfortunately, IFA does not provide the privilege of having online tutors but emailing Warren himself is also a good way to have your questions answered. There were pit-stops to assist you with each assignment, and I would recommend you utilise this opportunity as much as you can, especially if you are unsure about what you're doing.

End-of-Semester Exam

The final exam was a 200-mark paper that ran for 3 hours, with 15 minutes of additional reading time. This was the first semester that an IFA final exam did not include a multiple-choice section. The seemingly large number of marks was purely due to the fact that Warren did not want to give half marks. Hence, we were told to just think of it as a 100-mark paper that was doubled in mark size. There was a hurdle of 50% to pass the subject. Past papers were provided on LMS with extra information to discern any irrelevant questions. The exam consisted of 100 marks on "practical" questions and 100 marks on "theory" questions, so I suggest you familiarise yourself with answering both types of questions.

There were three semesters' worth of past exams and answers provided. I found these exams to be quite poorly written, with marks not always proportionate to effort required. Several questions were ambiguous, with answers failing to provide much clarification. For instance, we were informed that we did not need to remember any of the AASB numbers, however, these showed up occasionally in exams questions and sample answers.

Concluding Remarks

Generally speaking, you can think of this subject as the financial accounting aspect of ARA, with the double entry system added on top. If you have established a sound understanding of what financial accounting is and how it functions in ARA, IFA will be a breeze, as it does reiterate a great amount of content covered in ARA. With that being said, if you struggled in ARA, you're likely to struggle in IFA.

ACTL10001 Introduction to Actuarial Studies

Exemption status	Not an exemption subject, but a great introduction subject which covers the basics of financial mathematics.
Lecturer(s)	Associate Professor Shuanming Li
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour tutorial
Assessments	2 Microsoft Excel group assignments 2 × 10% 45-minute mid-semester test 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.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2018 Semester 2

Comments

Subject content

One week per dot point:

- Introduction, Simple interest and discount
- Compound interest, nominal and effective, force of interest
- Annuities
- Bonds and loans
- Demography, crude rates and population
- Mortality, life tables, stationary population
- Mortality experience, expectation of life, fertility, population projection
- Contingent payments
- Life insurance: Premium calculation
- Life insurance: Pricing and reserving parameter variability
- General insurance, reinsurance
- Superannuation and revision

If you've completed *Principles of Finance* before this subject (which most of you should have), you will soon realise that the first few weeks of ACTL10001 are very VERY similar to PoF, and will most likely think, "Why the heck are we spending a whole week on simple interest and simple discount? Wait we're spending another week just on compound interest? This subject is going to be so easy!" Yes, that was me. And yes, most of the questions in the earlier weeks of the subject can be solved using the knowledge and skills from PoF. However, you will also soon learn that there is no formula sheet in ACTL10001, and that the subject does not just teach Financial Mathematics and that there are probably around 20 million actuarial-specific notations that you will need to get your head around. If you don't do this early in the semester, you will most likely suffer during both the mid-semester and end-of-semester exam .

Lectures

There were 2 lectures, each being 1 hour. Everything during each lecture is fully recorded on lecture capture, though Shuanming's camera skills are questionable at times. To be honest, I must say that Shuanming's lectures are not for everyone, and I for instance found them quite difficult to follow. Nonetheless, he is knowledgeable and skilled in what he does. However, I really enjoyed how he would upload a summary/expectation of each week's content at the end of the week. Reviewing this can be a powerful tool for you to refine your understanding and can also assist you with your revision prior to exams. Everything covered in the lectures were usually already in the slides, so in my opinion, purely reading the slides in your own time is enough to comprehend the week's content, especially if it is a theory-heavy week. The solutions and steps for questions in the lecture slides are also included in the slides.

Tutorials

Unlike most of your other commerce subjects, Introduction to Actuarial Studies does not have any tutorial requirements. There are no required questions to attempt. You don't even have to attend any tutorials as attendance does not go towards your final mark. However, if you're lazy like me and don't review the weeks content in your own time, going to a tutorial is a great way to review and solidify your understanding of the knowledge and skills from each week.

Assessments and Assignments

There are two group assignments, each worth 10% of your final grade. Both assignments were done on Excel, so it would save you a great amount of time if you are familiar with different tools that you can utilise within Excel (make sure you attend *Actuarial Students' Society Subject Review*Excel workshop). The first assignment is quite short and straight forward and was based on the financial mathematics from weeks 1-4. The second assignment was a little trickier but was not impossible to do. 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 test was difficult, and the cohort average was $18/30$. Time constraint was the biggest issue for most students, so it is very important that you familiarise yourself with your $FX-82$ calculator before you head into the exam. Being able to use the memory function on your calculator saves an exorbitant amount of time.

End-of-Semester Exam

The end of semester exam was a 2-hour exam with 15 minutes of reading time. It was comprised of mostly application/practical questions, with a few marks on theory. The actual exam was much easier compared to the practice exams that were provided through LMS. I was told that actuarial exams are hard because you're pretty much doing 3 hours' worth of questions in the span of 2 hours. I guess this year was an exception. Many students found the final exam very doable. Again, make sure you know how your calculator works; it saves time and saves marks.

Final Remarks

Overall, this subject is a great way to see what the actuarial course is going to be like. It gives you a taste of the contents you'll be studying further down the line and is a good way to check if actuarial studies is really your thing.

ECON10003 Introductory Macroeconomics [SM2]

Exemption status	Not an exemption subject, but is a prerequisite for ECON20001 *Intermediate Macroeconomics* (CT7 *Business Economics* subject).
Lecturer(s)	Dr Lawrence Uren Nahid Khan
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour tutorial
Assessments	Tutorial attendance and participation 10% Macroeconomics feedback assessment Task 1 5% Assignment 1 - Group 10% Assignment 2 - Group 10% Macroeconomics feedback assessment Task 2 5% 2-hour end-of-semester exam 60% (Hurdle) As part of your tutorial preparation, pre-tutorial questions are to be completed prior to your tutorial. You will be assessed on your attempt on completing the questions irrespective of whether the answers are correct or not.
Textbook recommendation	Bernanke, B., Olekalns, N., & Frank, R. H. (2014). *Principles of Macroeconomics* (4th ed.). North Ryde, AU: McGraw-Hill. ✗ No. Personally, I did not find reading the textbook mandatory to my learning. However, it was useful in clarifying concepts and provided examples of variables that may affect the economy. I would suggest borrowing the textbook from the library, rather than purchasing it, since there are many copies available for students.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2018 Semester 2

Comments

Lecture schedule

Lectures

If you are like me, someone who is often discouraged by lectures that contain heavy text-slides and seemingly never-ending number of slides, then I highly recommend listening to Lawrence's lectures. His lectures are structured in a way that is straightforward and clear, with particular emphasis on concepts that are important for exam preparation. He generally annotates a lot on his lecture slides and explains each point listed in depth. He also makes the completed version available after the lectures, so do not worry about copying exactly what he annotated. Just make sure you really understand the models introduced in the lectures and how different variables can affect the model and the economy.

Week	Topic
1	Introduction & Measuring Output: GDP
2	Inflation and interest rates & Saving, wealth and investment
3	The Labour Market & Short-term Economic Fluctuations
4	Keynesian Model of the Economy
5	Keynesian Model of the Economy & Fiscal Policy
6	Monetary policy, inflation and financial markets
7	Aggregate Demand and Supply model
8	Introduction to Growth & Solow-Swan Model
9	Solow-Swan Model
10	International Trade
11	Exchange Rates
12	Balance of Payments

Tutorials

Preparation and attendance for tutorials, worth 10%, are the easiest marks you can obtain, so do not put yourself in the position of losing them! Tutorials commenced in the second week of the semester and were conducted under a collaborative learning format. Rather than the tutor re-introducing concepts explained in prior lectures, you are to work in small groups within your tutorial to answer a number of questions that test your understanding. These tutorials help to reinforce what you have learnt as well as teaching you to apply that knowledge to applicable exam questions.

Tutorial marks are allocated by providing evidence of your preparation of the tutorial (completing pre-tutorial questions), and the extent of your participation in class by demonstrating active listening and contribution to discussion.

Solutions to pre-tutorial questions will be provided on the LMS after all the tutorials have taken place. However, solutions to in-tutorial tasks will not be posted, so make sure to take notes while working through the questions and to really consolidate your understanding.

Including exam preparation, tutorials were tremendously helpful in completing the assignments. The in-tutorial questions and concepts explored were very similar to the assignment questions, so be sure to take note of the examples discussed in the tutorials especially those that were applied to the key macroeconomic models .

Assessments

Macroeconomics Feedback Assessment Tasks

Macroeconomics Feedback Assessment Task 1 and 2, worth 5% each, are multiple choice quizzes administered online through the LMS. We were given a short time frame, between 9am Thursday to 4pm Friday, to complete the 30-minute quiz. You will be asked to complete fifteen questions that were randomised from a supply of available questions. There were practice sample quizzes given that were similar to the types of questions you would get in the test.

Assignments

Assignments 1 and 2, worth 10% each, consisted of a number of short-answer style of questions. You are to complete the assignment in groups of three or less that are within your tutorial. Although it is listed as a group assignment, you have the choice of completing it by yourself. Just make sure to register yourself as a group even if you are working alone. I often have a hard time working in groups as it can become such a burden to chase people up to do their part or for them to complete it to the same standard as you would. Therefore, I chose to do the assignments by myself and I had no problems in doing so. In fact, I felt like it was much easier, so that option is there for you if you prefer working alone.

The assignment questions generally give an example of an occurrence (such as an increase in government spending or productivity) and requires you to explain how it causes a change in the model, and how the change affects the economy in the short or long term. The lecturer does go into depth with these examples in the lectures, so make sure you keep an eye out for them. The in-tutorial questions and textbook readings were also designed to help you as well.

The answers to the assignment questions will be released following the submission date. This is also a great tool to use for exam revision.

End-of-Semester Exam

The exam is a hurdle! I repeat, a hurdle! It was a 2 hour and 15 minute exam including 15 minutes of reading time. It was divided into two parts - multiple choice and a short answer section. The approved calculator for the exam is the Casio $FX-82$ (any suffix). Past exam papers are available on the library website, however, answers to only two papers were provided on the LMS.

In regard to preparation for the exam, tutor and lecturer consultations are available throughout the semester. If you prefer to remain anonymous, you can access the Online Tutor tool via the LMS which also allows you to directly ask questions to your tutor or lecturer. They will attempt to answer your question within 24 hours and on weekdays only.

The exam is entirely about your depth of understanding and how you can apply changes to exogenous and endogenous variables to the macroeconomic models. If you can really concentrate and understand why these changes are brought about, you will definitely do well. Enjoy and good luck!

ECON10004 Introductory Microeconomics [SM1]

Exemption status	CT7 *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)	Dr Eik Swee Associate Professor Tom Wilkening
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.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2018 Semester 1

Comments

Subject content

- Week 1: Introduction to Economics and its basic concepts
- Weeks 2–3: Perfectly Competitive Markets and its Mechanisms
- Weeks 4–5: Welfare and Market Failures
- Weeks 6–7: Firm and Managerial Economics
- Weeks 8–9: Profit Maximisation and Pricing
- Weeks 10–11: Game Theory
- Week 12: Exam Revision

If you're someone who studied Economics in VCE or equivalent, you can consider yourself to be in an advantage, at least for the first few weeks. The content will be quite similar to your high school Economics during these weeks, with just some extra details that are still intuitive and relatively easy to understand. If not, do not worry. The subject covers the basic economic concepts and ideas anyways, so no prior knowledge is required.

The subject does get more confusing in the later weeks, (the firm and managerial economics), so a tip would be to really get those foundational economic concepts in your head, as this will help you understand the harder content.

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

Whilst there is a fair bit of mathematics involved, understanding the theory is what will make you go from a 7/10 to an 8 or a 9. So, if you are a maths person (like me), do not fall into the trap of neglecting the theory and solely focusing on the maths. Whilst this works for some parts, it is not going to get you through to the end.

Readings, and hence textbooks, are not necessary in my opinion, although they can be a good reference if you are struggling to understand a concept.

Lectures

There are four lecture streams, two with each lecturer. Lecture slides are uploaded on LMS the week before and whilst the two lecturers use the same slides, their styles are quite different. I attended Eik's lectures.

Eik's lectures tend to be a bit fast-paced, and you may find yourself sitting there very confused from time to time. He started the semester using pen and paper to work through the examples (which were not recorded) so I would say it was necessary to attend the lectures to fully grasp the content. He later changed to using his touchpad to write and draw directly on the slides (due to the doc-cam being dodgy), so his workings were fully recorded in lecture capture since. Eik ran the two lecture streams in the morning.

Tutorials

Tutorial participation and attendance is an easy way to guarantee 10% of your total mark. Tutors assign a mark out of 10 for tutorial participation and one mark is deducted for each tutorial you miss after missing 4 tutorials. Asking questions is a simple way to appeal to the tutor that you are attentively participating.

There are pre-tutorial and in-tutorial sheets. As the name suggests, the pre-tutorial sheet is to be done prior to the tutorial, and whilst some tutors check these and use this as a basis for marking the 10%, some do not. Nevertheless, it is encouraged to attempt this as it will help consolidate the content from the lecture in the previous week.

The in-tutorial questions are of similar nature to that of the pre-tutorial, however at a slightly more challenging manner. Whilst answers for the pre-tute sheet are uploaded on LMS at the end of the week, in-tutorial sheet answers are only discussed by your tutor during the tutorial to incentivise you to attend. Do not procrastinate asking questions if you don't understand something. Chances are you're going to forget until exams come up.

Assignments and Assessments

The first assessment was a 25 minute online multiple-choice test to be done independently, with 10 questions to answer and worth 5% of the total mark. Appropriate revision material was provided, including practice exams and revision sessions ran by the lecturers. The slides that were used were later uploaded onto LMS, so attendance was not necessary. Whilst the content was not difficult, the wording of the questions was confusing so it is recommended that you take your time and read the questions thoroughly.

The two assignments that followed had a maximum of 750 and 1250 words respectively. However, this was only a maximum, and no minimum was set. Assignment 1 consisted of long extended questions, which students were encouraged to use diagrams and tables to answer, with some sentences explaining them. Assignment 2 was of similar nature, however it required a deeper understanding of the concepts learnt, as you had to create a case study of a real-life example through a topic chosen by the student (within the scope of the assignment). For both assignments, I would recommend relying

heavily on diagrams and tables, since it is near impossible to meet the word cap by answering all the questions fully in words. Diagrams with succinct explanation earned the highest marks.

Other Resources

I completed the subject without the textbook, and I can confidently say that they are not necessary. As previously mentioned they can be a good reference, however, google and youtube videos provide enough assistance to help you get through the subject. Online tutors and pit-stop tutorials are of great help, so utilise them throughout the semester, not just before the exams and assessments.

End-of-Semester Exam

The final exam was a 120-mark paper that ran for 2 hours, with 15 minutes reading time. There is a hurdle of 50% to pass the subject. The past papers could be accessed in the university library, with no answers available. However, there has been quite a few changes in the content of the subject, so some questions were ineffective. As no answers were provided, students relied on comparing answers with each other, going to pit-stop tutorials that were held everyday during SWOTVAC, and Online Tutors. Whilst pit-stop tutors were the most helpful, they were usually very crowded.

The exam consisted of three sections: multiple-choice, short-answer and long-answer application questions. The exam was fair and straight forward, though time constraints were many students' concern. Again, using well-labelled diagrams was a method to save time and earn the marks.

Concluding Remarks

Whilst the subject is intuitive and hence relatively easy for some students, this can also be a drawback for some students that do not understand these intuitive economic understanding as the whole subject holds it as a basis. Online Tutors are highly recommended, even if it is just reading the answer to another student's question, as it is likely you are going to be troubled by the same problem .

FNCE10002 Principles of Finance [SM1]

Exemption status	CT2 *Finance and Financial Reporting*, 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	2 × 1-hour lectures 1 × 1-hour tutorial
Assessments	Tutorial participation 10% Online Assignment due in Week 6 10% 1-hour mid-semester exam in Week 7 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. Berk, J. & DeMarzo, P. (2017), *Corporate Finance: The Core* (4th ed.), Pearson Global Edition Brealey, R., Myers, S. & Allen, F. (2017), *Principles of Corporate Finance* (12th ed.), North Ryde, AU: McGraw-Hill.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2018 Semester 1

Comments

Subject content

- Weeks 1-2: Overview and Introduction to Financial Mathematics
- Weeks 3-4: Applications in Financial Mathematics
- Weeks 5-6: Modern Portfolio Theory and Asset Pricing
- Week 7: Mid-semester exam
- Weeks 8-9: Capital Budgeting
- Weeks 10-11: Capital Structure and Payout Policy
- Week 12: Introduction to Options

The first few weeks of the subject are pretty much just maths, something you would do in Further Mathematics in VCE. I found that Principles of Finance, (especially in the first few weeks) is a little bit like the Physics equivalent of Commerce; you learn the theory in lectures, but when doing the questions, it's the formulae that are going to give you the answer. However, this whole mathematics-based approach ends after the mid semester exam, so it is encouraged that you try to understand the theory of the early weeks as these will be required to understand the latter half of the semester. No prior knowledge is required other than some basic mathematical skills that you would already be familiar with from previous years. Whilst Asjeet constantly repeats "I am doing the lecture assuming you've all done your readings", I don't think they

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

are essential, as I didn't even own a textbook myself and still found the subject doable. However, like any other subject, reading it may help your understanding of the theory of the subject.

Lectures

There were three lecture streams, each being two hours long. Asjeet recorded and uploaded every single one of them onto Lecture Capture. Sometimes he explains the same content in different ways for different lectures, so if what he says in the lecture you're watching doesn't make sense to you, try watching another stream of the same week. Whilst I prefer to attend the lecture than use lecture capture, I felt that it was better to use lecture capture for Finance, as the content can be quite hard to follow in the speed that Asjeet goes through. And because there always is a flow within the lecture, if you don't understand one part of the lecture early on, it is very likely that you are not going to comprehend the subsequent slides resulting in a waste of two hours as you will have to go through it again. Hence, being able to pause and understand each slide was helpful and was only possible using lecture capture. Asjeet lecture slides are also very self-explanatory, so there was no trouble in understanding them through the recording.

Tutorials

Every week you are given a tutorial sheet to complete. Part A of this sheet are to be done prior to your tutorial and handed in at the beginning of it. Tutors use this as a way to mark your attendance and hence this accounts for 10% of your total grade. Even if you do not understand the question, attempt them anyways, as it is not really homework that your tutor marks, but rather a way for the tutor to check that you have prepared for the tutorial. As long as there is visible evidence that you have had a go , your tutor will accept it regardless of whether the answer is correct or not. The remaining parts of the sheet are gone through during the tutorial by the tutor. They usually give some time for the students to collaborate and discuss the answers, and then go through them afterwards. Whilst these other parts of the tutorial sheet are not required to be completed prior to the tutorial, it is encouraged that you still attempt or have a read at least, as this will assist with the tutorial hour to be more effective.

Assignments and Assessments

The assignment, which accounted for 10% of the total grading, was just a simple 14 multiple choice quiz which was given out prior to the submission of the answers. It is open book as they are to be done at individual times, and you are given a few days to answer the 14 multiple choice questions. Honestly, I didn't even understand why this was worth 10%. Anyways, once you have worked out your answers, you had to input these answers onto the LMS. Instructions were clear, and the questions were fair and straightforward.

The mid-semester exam, which accounted for 20% of the total grading was pretty much the same as the previous assignment, the only difference being the time restriction (1 hour) and the fact that it was a closed book test. Again, 14 questions, fair and straightforward, a quick and easy way to earn 20%. I managed to finish the exam in 30 minutes. One tip for the mid-semester exam would be to familiarise yourself with the formula sheet. Just going through the formula sheet itself can be a great revision tool, and knowing when, where and how to use them will give you a great advantage in the mid-semester exam. Two practice materials were provided which were very similar to the exam itself.

End of Semester Exam

End of semester exam was a 2-hour exam with 15-minutes reading time, more focused on the content learnt after the mid-semester exam. It was a shocker for me, as I expected them to be mostly maths and formula based like the mid-semester exam; if I had read the ASS subject review for the previous year, I would have known that the end of semester exam focuses heavily on the theory side of finance . It included labelling a graph, recognising and explaining errors and such. Two practice papers were provided on LMS however these were not in a similar format to the actual exam. Nonetheless they were a great revision material. Expect a fair deal of theory in the end of semester exam, but with that being said, mathematical applications are still required.

Concluding remarks

Finance is a subject for those of you who enjoy the maths side of commerce in particular. However, it is essential to keep the balance between application and theory, especially in the latter weeks of the semester as not understanding the concepts will hinder your ability to effectively apply the skills.

MAST10006 Calculus 2 [SM1]

Exemption status	Not an exemption subject; however, you will need either • an average of at least 75 across this subject and MAST10007 *Linear Algebra* or • a total of at least 135 across this subject and MAST10008 *Accelerated Mathematics 1* to continue the major and enrol in ACTL20001 *Financial Mathematics I*.
Lecturer(s)	Dr Iwan Jensen
Weekly contact hours	3 × 1-hour lectures 1 × 1-hour tutorial
Assessments	4 individual assignments 4 × 5% 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	2017 Semester 1

Comments

Given you obtain above the prerequisite mark for Specialist Mathematics in high school, this subject should not cause a problem. Calculus 2 overall felt like an extension of Specialist undertaken in high school. The assignments were quite challenging but were helpful in aiding with exam preparation at the end of the semester, as well as the tutorial sheets. With 3 lectures a week, you do not want to fall behind in this subject otherwise it may be difficult to catch up.

Subject content

This subject covers limits, continuity, sequences and series, hyperbolic trigonometry, integral calculus, first and second order differential equations, and functions of two variables.

Other Comments

The material is quite straightforward and the lecture recording proved to be enough for studying the content. I found that jotting down everything on the partial lecture notes from the lecture capture and then revising back to understand the steps was sufficient to learn the required topics, and then going back and listening again to the lecturer's explanation for information I had trouble understanding.

I recommend keeping up with the exercise booklet questions, as it contained a wide variety of problems to tackle and solidify your understanding of topics. It is not something you want to fall behind in and leave all up to in SWOTVAC.

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

The assignments were almost always more challenging than the problems encountered in class, but with the aid of classmates and research they prepared you maybe a little too well for the exam, as the exam was nowhere near as difficult as some of the questions in the assignments. There were 4 worth 5% each, with a week given to complete and submit them.

The resources given to prepare for the 3-hour exam was more than adequate, with a number of past exams and answers provided to practice as well as consultation hours to ask tutors/lecturers difficult problems. Routinely completing these exams prepared us well with the format and the types of questions encountered in the exam. Overall, I found that the exam was very similar to the past exams, hence nothing struck out as surprising and the questions were relatively straightforward.

In conclusion, this subject gives you an introductory insight into the Mathematics in this major and it is not impossible to meet the 75% requirement as long as you work persistently in this subject.

MAST10007 Linear Algebra [SM2]

Exemption status	Not an exemption subject; however, you will need either • an average of at least 75 across this subject and MAST10006 *Calculus 2* or • a total of at least 135 across this subject and MAST10009 *Accelerated Mathematics 2* to continue the major and enrol in ACTL20001 *Financial Mathematics I*.
Lecturer(s)	Paul Norbury, David Ridout, Jesse Gell-Redman
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	There isn't a prescribed textbook, although the lecturer suggests any textbook on linear algebra in the ERC as additional material. ✓ Make sure to get the orange 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	2017 Semester 2

Comments

Subject content

You can imagine the Linear Algebra course to be set up with many "tools" or bits of theory (i.e. Gauss-Jordan elimination, triple cross product) that you'll be using in conjunction to understand more complex and abstract theory (i.e. General vector spaces, eigenvectors) taught later in the course.

1. Linear equations

   At the start of the semester you learn about systems of equations and how to do row operations to solve the system. It's important to really understand this theory because it is the foundation for the rest of the course.

2. Matrices and determinants

   You'll review matrix operations then learn a lot of terminology regarding matrices. Elementary row operations will be brought up again and related to the rank and determinant of matrices.

3. Euclidean vector spaces

   Here the lectures leave the matrices and move into vectors and operations with vectors such as the dot product and cross product.

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In the first 3 topics, you'll basically learn 'tools' that are specific operations that you'll be applying and building on for the rest of the course. The tools will feel unrelated but it is essential to memorize to be able to focus on grasping the more abstract, complex theory later on.

4. General vector spaces

   This is very theoretical part of the course and an extension of Topic 3, but also a foundation you'll need to understand completely to build upon. You will learn about vector spaces that are to Cartesian planes like vectors are to functions. In addition, you'll be introduced to spanning sets and bases as well as linear independence.

5. Linear transformations

   This topic will build upon what you've learnt in Topic 2 and 4. You will combine matrix operations and general vectors (by defining the vector space in terms of matrix vectors) to learn about a way to transform vectors and vector spaces.

6. Inner product spaces

   This topic is basically an alternate, more abstract version of Topic 4, where the definition of the "tool" dot product you learnt in Topic 1 is altered.

7. Eigenvalues and eigenvectors

   This topic is a more sophisticated extension of Topic 3 and 4, where you learn to manipulate vector spaces with matrix operations such as multiplication and row operations to simplify linear transformations that you learn in Topic 5.

So as you can hopefully see, the theory taught in Linear Algebra is very linked to each other and you should make sure you keep up with the theory, otherwise it is easy to get confused by the twists and next-level theory that's introduced. To cement your understanding, the exercise book is an excellent help. Understanding the foundations and the intuition behind the operations you apply, and not just memorizing how to apply the operations, will make grasping the next-level theory later easier as well.

The actual maths and algebra involved in Linear Algebra is not that complex; it's mainly addition and multiplication, so you just need to be careful with negative signs and not making silly mistakes. However, remembering all the theorems (for vector spaces, matrix operations, determining determinants, finding eigenvectors, etc.) is difficult.

Tutorials

In addition to the exercise book being a great help in cementing theory, the tutorials where you'll be able to ask your tutor questions about the theory and intuition are incredibly useful. Like most other maths subjects, you'll get extra questions to work on in addition to the exercise book and the questions are set up chronologically to deepen your understanding the theory.

Assignments

Unfortunately, you will be getting 10 weekly assignments for Linear Algebra. It was very tedious to do them but they are pretty short. Usually you write the assignment but sometimes it is done online (or both). Not all the questions are marked.

It is excellent to go to the tutorials because questions in the assignment are often similar to the tutorial questions and by getting feedback on the answers and method to solve the questions, you can avoid many mistakes in the assignments.

MATLAB

Beside the theory you'll be learning, you'll also be learning how to use MATLAB to do Linear Algebra. The language to use MATLAB also requires memorization so it is good to go to the lab classes after every tutorial (the Tutorial 2 you'll see on your timetable), because systematic repetition to memorize is very true with MATLAB. The MATLAB test in Week 12 is pretty straightforward so just make sure you know how to do questions unique to MATLAB that can't be done on paper, as you'll be primarily tested on those. You'll also be tested on more tedious questions that can be handwritten (for example changing parametric equations to Cartesian equations).

End-of-Semester Exam

There are not many twists and turns in the examination, but due to the variety of questions to be asked with the range of theories to be tested on, you really need to understand all the bits and bobs of theory. The theory in Linear Algebra is mainly to do with methodology so by just remembering the methods to solve, you can apply it mechanically and if you don't make silly mistakes you'll get the right answer.

Key takeaway is: Linear Algebra is simple if you can conquer the numerous theorems and methods to solve. And to really ingrain all that into your mind, it is effective to understand the theory and its intuition and (depending on how you like to learn) to practice, practice, practice!

MAST10008 Accelerated Mathematics 1

Exemption status	Not an exemption subject; however, you will need either • an average of at least 60 across this subject and MAST10009 *Accelerated Mathematics 2* or • a total of at least 135 across this subject and MAST10006 *Calculus 2* to continue the major and enrol in ACTL20001 *Financial Mathematics I*.
Lecturer(s)	Dr Alexandru Ghitza
Weekly contact hours	1 × 2-hour lecture 2 × 1-hour lectures 1 × 1-hour tutorial 1 × 1-hour MATLAB tutorial
Assessments	3 individual online tests in weeks 4, 5, & 12 — 3 × 2% 3 individual assignments due in weeks 7, 8 & 12 — 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. A PDF-version of the textbook was uploaded onto the LMS before the semester. Overall, this textbook is overly complicated in its explanation of content and utterly unappealing to the eye, making the reading experience an absolute chore. The lecture notes coupled with a number of YouTube channels, such as **Khan Academy** and **3Blue1Brown**, are more than sufficient for success. ✗ I do not recommend this textbook at all.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2018 Semester 1

Comments

MAST10008 Accelerated Mathematics 1 (AM1) is a course about linear algebra, which is uncharted territory for those who are fresh out of high school. This course challenges conventional high school mathematics, reshaping students' understanding of vectors and introducing them to higher-dimensional spaces. While the content is definitely dense, it is doable if you spend the time understanding the purpose of each of these topics in the grand scheme of things.

To succeed in this subject, you should possess both a mathematical and visual understanding of the content. Following the lecture notes, watching videos from 'Khan Academy' and doing the problem booklet will polish up your mathematical computations. I found that the linear algebra series created by '3Blue1Brown' is exceptional at teaching you how to visualise the content in this course, so I highly recommend watching the videos.

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

Subject content

1. Linear Equations and Matrices

   This topic introduces students to matrix arithmetic and some properties of matrices. While much of this topic is not explicitly examined on the end-of-semester exam, this knowledge is fundamental for all subsequent topics in this course. Although I never learned matrices in high school, I found that doing questions from the problem booklet helped concrete my understanding.

   On top of learning how to row reduce quickly and accurately, you need to know how to compute inverses and determinants of matrices. I recommend understanding the relationship between determinants and areas, as this will aid your learning of linear transformations.

2. Vectors and Solid Geometry

   This topic covers lines, planes and simple vector geometry, which should merely be revision for students. While formulae can be applied to calculate distances between lines and planes, many of these computations can be performed if you visualise the position of lines and planes. Few marks are dedicated to this topic in the end-of-semester exam.

   The fundamental skills you should know are simple vector arithmetic and converting between the parametric and Cartesian form of lines and planes. These skills will then be applied to compute angles and distances between lines and planes in three-dimensional space.

3. Mathematical Induction, Proofs and Numbers

   This topic introduces students to the different fields, as well as different forms of proof. While you should be familiar with proofs by contradiction, focus your attention on proofs by induction; looking at the past end-of-semester exams, there has always been one proof by induction question.

   You should be so familiar with induction questions that it becomes second nature – this will save you lots of time in the end-of-semester exam. Ensure that you know how to prove both equalities and inequalities by induction.

4. Complex Numbers

   This topic covers simple complex numbers arithmetic, which should also be revision for students. End-of-semester exam questions about complex numbers are very similar to the questions on the problem booklet, so familiarising yourself with them would prove helpful.

   Exam questions often focus on the use of De Moivre's Theorem. Make sure you also know how to apply complex arithmetic to differentiation and integrals, as these are examiner favourites.

5. Vector Spaces

   This topic marks a turning point for AM1 students, for it is where students' preconceptions of vectors and spaces are challenged. Do not fixate yourself on past knowledge — begin the topic with an open-mind and simply absorb what the lecturer is saying. Watching videos about visualising vector spaces would definitely help you cope with the abstract nature of this content. Personally, I was completely blur about what vector spaces represented until I could visualise them. For me, it was helpful to think about vector spaces as an umbrella term, with the Cartesian plane — something we are all familiar with – being one specific example of a vector space.

   It is vital that you know the axioms for subspaces, as typical exam questions ask you to determine whether a certain set is a subspace. Knowing how to rigorously identify subspaces is therefore also extremely important. Make sure

you know the difference between spans and bases, as well as linear dependence and independence. You should also be comfortable working in vector spaces such as functions, polynomials and matrices.

6. Inner Product Spaces

   This topic covers norms and angles, as well as orthogonality and orthonormality. End-of-semester exams often ask about inner product axioms and the Gram-Schmidt process. Instead of memorising the Gram-Schmidt formula, understanding its derivation by visualising the vectors will ensure accuracy. For me, it was helpful to think about inner product spaces as an umbrella term, with the dot product being one specific example of an inner product.

7. Linear Transformations

   Arguably the hardest topic in the course, linear transformations unfortunately also constitute the largest proportion of end-of-semester exams. Again, learning the axioms of linear transformations is vital, as typical exam questions ask to prove whether a transformation is linear. You should also be able to readily convert a linear transformation into matrix form. While the lectures tackle this problem rather formulaically, videos on YouTube do a fantastic job at explaining its derivation.

8. Eigenvalues and Eigenvectors

   Eigenvalues and eigenvectors, the last topic about linear algebra, is the easiest to grasp. Typical exam questions ask about diagonalization and identifying eigenvalues. Visualising where eigenvalues and eigenvectors are in a linear transformation will definitely help you answer questions, and the videos created by '3Blue1Brown' demonstrate this perfectly.

9. Functions of Two Variables

   This topic covers surfaces in three-dimensional space, gradients, tangents, as well as partial derivatives and double integrals. While it is the last topic in AM1, there are quite a few formulae that you must know, such as the conditions for local minima, maxima and saddle points. End-of-semester exam questions are very similar to those in the problem booklet, so I found it very helpful to attempt all the questions in this topic.

Lectures

Lectures proceed at a very fast pace, so give yourself time to absorb and understand the content. Make sure you are keeping up with the problem booklet questions instead of cramming them at the end of the semester — you are definitely not going to finish the entire booklet in a couple of days. Although I attended most lectures throughout the semester, I believe watching them on Lecture Capture is actually better. Since each lecture is structured such that the content in the latter half of the lecture builds upon the content in the first half, it would be helpful to pause and think through each step before moving on.

Overall, Dr Alexandru Ghitza was a great lecturer. Extremely knowledgeable yet easy-to-understand, Alex (as we call him) gave us a wonderful taste of what university mathematics looks like. He often applied the concepts we learned to real-life situations, allowing us to build genuine interest for linear algebra. Every lecture, Alex would work through the lecture notes on the DocCam and students would simply copy down what he wrote.

Tutorials

The way I look at it is — you have paid to attend university, so why not attend the classes you have paid for? AM1 tutorials generally encompass attempting questions in small groups with a tutor walking around helping each group. The questions are a very good reflection of the difficulty of the end-of-semester exam, so knowing how to do these questions will hold you in good stead. The tutors are smart blokes and blokettes, so pick at their brains and ask them tons of questions. Personally, I found that talking to my tutor solidified my understanding of the content because they explained the interrelationship between each topic and so explained how each topic fits together.

The laboratory sessions are similar in nature to the tutorials in that a tutor roams the computer lab while you attempt a lab sheet individually. Most of the content covered in the lab is extension and pretty useless for the end-of-semester exam, but nevertheless, it typically helped deepen my understanding of that topic. Look over all the lab sheets before the MATLAB exam to familiarise yourself with all the commands that you have learned to use.

Online and Written Assessments

The online tests are generally very short and simple – you should be looking to achieve full marks on them. Questions are very generic and test you on basic knowledge and understanding. A pro-tip is to check your answers with a calculator or MATLAB!

The written assignments, on the other hand, are tedious and long – tutors can basically take away marks for any reason, so give it your best crack and hope for the best. Questions typically encompass tedious calculations with 'ugly' numbers or proofs. Tutors look for very specific details in regard to layout, so make sure you are following the exact format seen in lectures.

MATLAB Test

The MATLAB test is out of 25 marks and serves as a great entrée for the end-of-semester exam, for it reflects its difficulty and covers the entire course. One-fifth of the test requires you to write a program in MATLAB which was barely mentioned in class. So, unless you already know how to program, these five marks are not worth your time to learn programming. The other 20 marks are relatively simple, only requiring you to write simple commands in MATLAB to answer the questions, all of which you have covered in the laboratory sessions. But, of course, you must know what commands to even write, so understanding the content comes first.

End of Semester Exam

The 2018 end-of-semester exam was out of 96 marks but was out of 100 marks in prior years. Most marks were concentrated on Topics 5-9, and while the exam was definitely tough, it is doable in the three-hour timeframe. Questions are very similar to worked examples in the lecture notes and some questions in the problem booklet. You are not allowed to use a calculator in the exam, so be sure to do a lot of mental arithmetic accurately and quickly. Note that each question and sub-question don't carry very many marks – generally two to four marks. So, if you get the answer wrong due to an arithmetic error, you will be quite harshly penalised. My advice is to be very meticulous and mindful of all the arithmetic you are performing, ideally checking them as you go.

Practice exams are available on the University's library website, but answers are not available. Nevertheless, past exams are still a satisfactory indication of difficulty and style of questions, so give them a crack.

Concluding Remarks

All in all, AM1 is definitely going to be one of the hardest subjects in your first semester, for the content is dense and exam questions are often demanding. In saying that, it was my favourite subject given the abstract nature of the concepts, which garnered much of my interest.

My biggest piece of advice for those who choose AM1 is to **visualise, visualise and visualise**. Space and vectors are, quite sensibly, visual notions, and it is no different when considering the concepts in AM1. The linear algebra series created by '3Blue1Brown' was frankly life-changing; it taught me how to visualise all the concepts taught in AM1, which genuinely helped me solve the questions on the exam. It is without any hesitation that I recommend the linear algebra series created by '3Blue1Brown'.

MAST10009 Accelerated Mathematics 2

Exemption status	Not an exemption subject; however, you will need either • an average of at least 60 across this subject and MAST10008 *Accelerated Mathematics 1* or • a total of at least 135 across this subject and MAST10007 *Linear Algebra* to continue the major and enrol in ACTL20001 *Financial Mathematics I*.
Lecturer(s)	Professor Barry Hughes
Weekly contact hours	4 × 1-hour lectures 1 × 1-hour tutorial
Assessments	2 individual assignments 2 × 5% 45-minute mid-semester test 10% 3-hour end-of-semester exam 80%
Textbook recommendation	The yellow MAST10009 Accelerated Mathematics 2 book is the designated textbook. While this book is extremely dense, it is written by Barry specifically for this course. You will need to purchase the book and consult it regularly; it will become your bible. It includes the entire collection of lecture notes, as well as practice problems for each lecture. I cannot stress just how important this textbook is.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2018 Semester 2

Comments

MAST10009 Accelerated Mathematics 2 AM2 introduces students to the mathematical rigour of real analysis and trains students in generic first-year university calculus. While this subject has a reputation for being the most challenging subject in first-year actuarial studies, students generally do well at the end of the semester. What most students (myself included) struggled with at first was the rigour expected by Barry and his tutors in terms of succinct mathematical presentation, clarity of arguments, as well as logical thinking. As redundant as it may seem, Barry essentially wanted to test whether you understood the content that he taught, and I will suggest ways for which you can achieve this for each topic in the Subject Content section. To succeed in this course, you will need to regularly review the lectures and stay up-to-date with the lecture content. Not only this, but you also need to ensure that you can mimic the proofs that he presents and, most importantly, understand the definitions and theories he teaches. Whilst not recommended by some intelligent lasses, I found that visualising the theories Barry presented through the Cartesian plane and analysing an example function or sequence solidified my understanding of the theory. Don't be phased when it takes one or two hours just to fully visualise and grasp one concept, for it is worth it in the scope of this subject. Contrary to popular (and Barry's) opinion, I do not think you need to do all the questions in the Problem Booklet to achieve a good mark in this course, since the questions in the problem booklet don't reflect the difficulty of the exam very well, as most questions are a lot harder than exam questions. In fact, I didn't do any problems after the mid-semester exam, and did a lot better in the end-of-semester exam than the mid-semester exam.

Subject content

1. **Sequences**

   This topic reintroduces students to the high-school concept of limits, but in a more mathematically rigorous manner. Continuing on from this, Barry introduces the concepts of convergence and divergence, limit theorems, as well as special genres of sequences. While Barry doesn't dedicate much time to Landau Symbols, or the concept of asymptotic equivalence, I found that many questions in the mid-semester and end-of-semester exam required them. So, I highly recommend that you familiarise yourself with them and approach questions equipped with the notion of asymptotic equivalence at the front of your mind to simplify the task.

   While the concepts in this topic are not explicitly examined other than in the mid-semester exam, these ideas form the foundation of some topics to come, so it is absolutely vital that you grasp these ideas quickly. What worked for me was visualising these ideas on a Cartesian plane with a random sequence and specific values for the variables (ϵ, N etc.), and then generalising it to arbitrary variables upon understanding the specific cases.

2. **Functions, Limits and Continuity**

   Extending upon the ideas of limits and behaviours of sequences, this topic covers the limits and behaviours of functions and reconstructs the idea of continuity. Though you will notice a significant leap in the number of definitions that you must now memorise, ensure that you are still dedicating your brain space to them instead of something else, like beer. Definitions also start becoming very finicky from here on out, with very exact intervals or inequalities that must be written.

   Again, the concepts in this topic are not explicitly examined in the end-of-semester exam, but is, nevertheless, important in the grand scheme of things. If you discovered an effective way to understand concepts in Topic 1, apply it to this topic as well, for the ideas are quite similar in nature.

3. **Differential Calculus**

   This topic re-examines high school differential calculus in greater detail and introduces students to vital theories like Rolle's Theorem and Mean Value Theorem. For some reason, Barry very much enjoys examining these topics and often asks students to recite the definitions or theorems in this topic. Barry also introduces the hyperbolic trigonometric functions here and also loves to incorporate these into exam questions, so make sure you are familiar with the properties of these functions.

   Fundamentally, the ideas in this topic were quite visual and rather simple to grasp. However, there were specific applications of these theorems and proofs using these theorems that you must familiarise yourself with.

4. **Integral Calculus**

   Whilst only covering four lectures, the idea of Riemann integrability and partial sums is vital for Improper Integrals in the future. Again, Barry revolutionises how you should think about integration, but hopefully you familiarised yourself to Barry's unusual style of teaching by this time.

   Barry likes to examine definitions for this topic, so make sure you carve these definitions into memory more than ever. I found that thinking about a model function, drawing upper and lower partial sums and refining them helped me grasp Darboux integrals and Riemann integration rather quickly.

5. **Differential Equations**

   For what's meant to be the point where the subject becomes relatively easier since you enter Calculus 2 territory, I found this topic to be quite challenging at first and taught rather messily. To give you a clearer rundown than Barry,

you are introduced to a number of different types of differential equations (both first order and second order) and taught very specific ways to solve them. Make sure you can identify the type of differential equation on first glance and memorise the method to solve them.

Barry also studies some applications of differential equations, which are mostly always examined. I recommend remembering the way that Barry approaches each problem, instead of just remembering the solution equations. In saying this, do not discount the importance of knowing the solution equations, for these will often simplify the problem at hand, especially when complex numbers come into play.

6. **Improper Integrals**

   This topic is rather short covering just three lectures, but nevertheless, vital for the end-of-semester exam. Exam questions encompass verifying whether a function is an improper integrable or not. Make sure you are familiar with the conditions for improper and Riemann integrability. A technique that is often used is splitting up functions into separate intervals and looking at the integrability of each interval. You will often need to use ideas of limits, continuity and Landau symbols in conjunction to verify the integrability of specific intervals.

7. **Infinite Series**

   Although this is the last topic in the semester, it is one of the easiest to understand and constitutes the largest proportion of all end-of-semester exams. Dedicate time to memorising the conditions for using each test, for Barry will often ask you to recite these in the exam. The only complication with this topic is knowing which test to use for each function, you will need to notice these patterns.

Lectures

Lectures proceed at a very fast pace, so give yourself time to absorb and understand the content. While Barry advised that you do not miss a single lecture, I felt like it was perfectly fine to skip some and catch up on them later. Even though he wrote the worked examples on the board, he talks through every line he writes up, so you can essentially transcribe him or get the examples from a friend. The lectures were well-structured, where most of the content led on from each other, creating a logical flow from lecture to lecture. What I found worst about Barry was the fact he had to skip so many steps in his explanation due to the amount of content he had to get through for this subject. This meant that you needed to review each lecture very thoroughly and fill in the gaps yourself (or go to a consultation).

Tutorials

The tutorials were not necessary to attend, as they just went through questions in the Problem Booklet. The tutor did not provide more insight than was covered in the lecture. While the tutor helped us through questions when we didn't know how to do them, this could be achieved through attending a consultation. In saying this, I did feel like I understood the content a lot better after attending the tutorials.

Individual Assignments

Barry's assignments were both very complicated and difficult to get a high mark on. I do not recommend doing his assignments right before the deadline, as they require a lot of thought. His assignment questions always required you to think

about many different things, especially since most of his questions deal with variables instead of numbers. This meant that you had to consider the cases for different values of the variables, for instance.

Mid-semester test

The mid-semester exam was out of 40 marks, with a time limit of 45 minutes. The biggest problem with this exam was the time limit – most students felt very pressed for time. Make sure that you know your definitions and theorems very well, as this constituted more than one-fifth of the exam. They were very harsh with the level of detail expected in answers, taking marks away for missing justification. For instance, you would lose a mark if you didn't explicitly state that you used a limit law when used.

End-of-semester exam

The 2018 end-of-semester exam was out of 125 marks. Content-wise, the exam was very similar to past exams, so the best preparation for it would be to do the past exams Barry provides. What was a little different to the past exams were the functions used in questions. I found that the functions Barry used in the 2018 end-of-semester exam was a lot more complicated than previous years, making it quite scary at first sight. However, once you got past the initial fear, the questions were quite doable, if you were able to break down them down to little segments. Overall, the exam was quite straightforward with little tricks and turns. Again, make sure you know your definitions and theories and are able to think on your feet. Good luck!

Second-Year Subjects

Contents

ACTL20001 Financial Mathematics I

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	2018 Semester 1

Comments

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) is split into 4 sections, based on the first 4 chapters of Compound Interest and its applications. Quite a lot of the content will be familiar because it builds upon material taught in ACTL10001 *Introduction to Actuarial Studies* and, to some extent, FNCE10002 *Principles of Finance*. However, this subject requires a deeper understanding of those ideas and the ability to apply them in more nuanced problems. Obviously, new content is taught as well — this mostly occurs after the mid-semester break. Although the subject is heavily dependent on the use of formulae, a substantial amount of theory about major asset types is taught in Chapter 4. This is a bit dry but can easily be rote-learned for the exam.

The lecture slides are the dot-points version of the corresponding chapter in the textbook and thus the content can be completely learnt from either source.

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

Lectures

There is only one lecture stream since there aren't that many actuarial students. This may mean having to build your timetable around FM1 lectures. Lecture slides for each chapter were uploaded altogether at the beginning of the semester (even though the subject guide says "available prior to the lectures, hopefully the week before").

Ping tends to explain the concept and then follow up with examples. Most examples tend to be clear about what they are asking and make good references for when you attempt harder questions. Although most lecture slides can be understood without listening to Ping, I would particularly recommend paying attention when she explains proofs – not just because we often think a proof makes sense but then fail to reproduce it, but it also helps with understanding why a formula can be applied (and, consequently, recognising when to use it).

Tutorials

Tutorial attendance rates for FM1 is low since there are no attendance/participation marks. This meant that for those who make the effort to attempt tutorial questions and go to tutorials, they get a very personalised experience. I was not one of those lucky few. Although I was able to attempt tutorial questions by myself and check against solutions, it would have been worth at least attending the tutorials for which I struggled with the tutorial sheet.

Tutorial questions tend to be a mix of practising simple concepts, applying concepts to more complex problems and proofs. Solutions are uploaded to the LMS (usually on Friday afternoon) and explain the working out clearly. Like the lecture slides, solutions can be read and understood on your own, but it's beneficial to listen to someone explain the approach.

Assignments

There are two group assignments that contribute 10% each. They are supposed to be completed in groups of 3-5, but you can request to work individually or in a pair. A common method for groups was to do all the questions individually and then compare answers with group members. I recommend doing this as it gives you an opportunity to understand how others approach questions and you may learn new techniques and shortcuts.

Assignment questions were released about 3 weeks before they were due. This was more than sufficient time, as both assignments were quite easy. Both assignments were out of 20 marks. Assignment 1 had 5 questions that tested knowledge of the content from weeks 1-6 (Chapter 1 and most of Chapter 2). Assignment 2 had 6 questions that focused on content from weeks 7-10 (the rest of Chapter 2 and Chapter 3).

Mid-Semester Exam

The mid-semester exam in week 7 was a 45-minute exam with 5 minutes of reading time. The exam had 5 questions that covered content from the first half of the semester. There is no formula sheet, so formulae must be committed to memory and a calculator is required. The previous year's paper was made available with solutions and was a good representation of what to expect in terms of structure and question types.

The paper for this semester was somewhat challenging, but it was mainly the pressure of time that stressed people out and may have prevented them from achieving higher scores. The paper and its solutions were uploaded to the LMS two weeks after the exam. Feedback was also provided on the performance of the cohort and common mistakes were identified. It

was possible to review your exam in your enrolled tutorial the following week if you wanted to see check your marks or see what you got wrong. I think that having access to the solutions and then reviewing your paper is useful for recognising areas that you need to practise.

End-of-Semester Exam

The final exam was a 70-mark paper that ran for 2 hours with 15 minutes of reading time. There is a hurdle of 50% in the exam to pass the subject. Like the mid-semester exam, it was necessary to have a calculator and no formula sheet was provided. Exams from the past three years were uploaded to the LMS in week 12.

The final exam was quite similar in structure to the past papers. As the questions were not in order of difficulty, I chose to do the questions I was sure about first to guarantee as many marks as possible, in case I wasted too much time trying to unpack a complex question. Although there is a lot of formulae, if you practise consistently throughout the semester, it's not difficult to memorise them all for the final exam. Otherwise, you could just rote learn them. However, exam questions tend to be complicated and just knowing all the formulae is useless if you can't figure out what information the question gives you. Additionally, make sure you revise everything, including those seemingly unimportant rules of thumb and simple tests – they just might come up on the final exam.

Necessary Resources

The required textbook for FM1 is Compound Interest and its applications. It is also used for ACTL20002 *Financial Mathematics II*. The book is available from The Co-op for $33. A PDF of notes on the textbook was uploaded to the LMS at the beginning of the semester with some edits and exclusions. The textbook is a lot denser than the lecture slides and, as mentioned before, reading it may not be necessary. However, you may prefer it if you learn better by reading. The textbook also has practice questions with solutions. I recommend doing the relevant exercises each week to consolidate your understanding as they can help you become familiar with different question styles and practise applying important concepts.

Concluding Remarks

Financial Mathematics I is not too difficult during the semester. As long as you don't forget everything you learnt in *Introduction to Actuarial Studies*, most of the content should be easy to digest. The difficulty of this subject can be attributed to the final exam which tests your ability to apply what you know to complicated situations. In my opinion, the best way to prepare is to practise consistently and learn different approaches (from tutorials or friends). Also, if you tend to become stressed when you are faced with complex problems, it is important to learn how to manipulate them into problems you can solve.

ACTL20002 Financial Mathematics II (1)

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

Comments

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.

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.

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	2 × Individual Excel Assignments 2 × 10% 45-minute mid-semester test 10% 2-hour final exam 70%
Textbook recommendation	Fitzherbert R., & Pitt, D. (2012). *Compound Interest and its applications*. The textbook is used in both FM1 and FM2. The lectures do not follow the textbook, but it is recommended to use the textbook to supplement the lectures. Further notes were also provided for week 7-12 content, which were extremely useful.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2018 Semester 2

Comments

This is considered to be a challenging subject for most students. Students are required to not only understand the content thoroughly, but also to be able to manipulate and apply the content. The subject starts off with similar content to FM1, but the difficulty and the pace of the subject increase significantly as the semester progresses. After the mid-semester exam, students often come to the realisation that simply memorising formulas and rote learning are insufficient for them to succeed in the subject. It is imperative for students to learn, understand and practise the concepts of the subject in order to fully understand it.

Subject content

- Weeks 1–2: Discount Securities and Coupon Bonds
- Week 3: Measuring Investment Performance
- Week 4: Interest Rates and Immunisation
- Week 5: Interest Rates, Arbitrage and Replication
- Week 6: Arbitrage, Forwards and Default
- Week 7–8: IID Returns, Valuation with Stochastic Rate of Return, Moments
- Week 9–10: Life Insurance Applications and Lognormal Distribution
- Week 11–12: Time Series Models and Simulation

When comparing FM1 to FM2 in terms of content, the exponential growth in the difficulties of actuarial subjects is apparent. There is quite a significant jump in difficulty from weeks 1–6 to weeks 7–12. During the first half of the semester, the most confusing concepts to me were floating rate notes, arbitrage and immunisation. It is recommended for students to fully understand these topics as there can be many different ways for them to be tested in the exam.

Personally, for floating rate notes, I feel that we had insufficient exposure in lectures for us to understand it fully without seeking external resources online (i.e. YouTube). Arbitrage and replicating assets are confusing concepts that I highly recommend that students practise by doing different types of questions (i.e. replicating a future that allows an investor to buy or sell an underlying derivative in the future). The concept of immunisation will be a lot more comprehensible if you understand the relationships between duration, volatility and convexity.

From week 7 onwards, the concepts become a lot more mathematically intensive as we learn about Lognormal distributions and revise several concepts from the probability course. I found the additional course notes written by David Dickson to be most helpful. I recommend that students fully understand the technical mathematical concepts in week 7 and 8, as it will make the remainder of the course a lot more understandable. Personally, I found the concept of life insurance application easiest during the second half of the semester, as it was relatively similar to the concept of present value, except you have to include a probability for each payment as they are no longer certain.

Lectures

Students are encouraged to go to lectures, but it is possible to learn the content through Lecture Capture. However, it is highly recommended for students to stay up-to-date with the concepts as you will most likely unable to achieve a satisfactory mark through cramming.

Jason utilised Excel quite frequently during his lectures. You will be required to memorise Excel formulas and commands. Therefore, it is recommended for you to practise and learn the formulas that are demonstrated in class.

Tutorials

Tutorials are not compulsory for FM2. However, this is not an invitation for you to not attend. Even if you are not up-to-date with the course content, you should still attend the tutorials as you will still be able to learn through the questions and explanations that the tutor provides in class. Most importantly, get yourself the working out for the tutorial questions either by attending or through a friend as they are not provided to you online. These will be extremely helping when you start revising.

Assignments

The two assignments are both on Excel. Students are provided with a set of criteria and are required to develop a model based on that. It is required to be a live model where the assessor can change a set of parameters and the Excel sheet should produce an output accordingly. After submission of the assignment, Jason provided students with a score below 8/10 the opportunity to resubmit. The resubmission will be able to get a maximum score of 8.

Mid-Semester test

This is a 45-minute exam with no reading time that accounts for 10% of your final grade. Don't stress! This will be a moment of realisation for many students as you are shown the difficulties of the subject. The exam changes every year, so be sure to understand the concepts and forget about memorising the answers for the past papers.

Final exam

The final exam is a 2-hour paper with 15 minutes reading time. Again, past papers are provided but it is highly unlikely for similar questions to appear again. This semester's paper was long and difficult. There were a lot of marks for stating definitions, which were quite unexpected as they rarely appeared in the past. It is recommended that you check your workings as you go, as a simple error may require you to restart the question and this may cost you your exemption. Students should aim to improve their application and problem-solving skills whilst maintaining accuracy and speed.

Concluding remarks

Overall, this subject is a lot more demanding than FM1 as it not only requires students to fully understand the concepts, but also be able to apply them efficiently and effectively.

ECON20001 Intermediate Macroeconomics (1)

Exemption status	CT7 *Business Economics*, in conjunction with ECON10004 *Introductory Microeconomics*. An average of 73 across this subject and ECON10004 *Introductory Microeconomics* is needed, with no fails.
Lecturer(s)	Dr Mei Dong
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour tutorial
Assessments	Tutorial participation (incl Online Tutorial) 10% Online multiple-choice test, set in Week 6 5% Individual assignment, due in Week 8 12.5% Individual assignment, due in Week 10 12.5% 2-hour end-of-semester exam 60%
Textbook recommendation	Blanchard, O. (2017). *Macroeconomics Australasian Edition*. Frenchs Forest, AU: Pearson Education Australia.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2018 Semester 2

Comments

In terms of the overall structure and main topics covered, this subject is very similar to ECON10003 *Introductory Macroeconomics*. While the titles and graphs of each unit might seem familiar, there is a greater focus on manipulating mathematical formulae, taking more variables into consideration. It is strongly recommended that you fully understand the logic of the derivations and are able to detail the whole process. Memorising the formulae presented in lectures is not suggested as it is hard and risky to do so . Personally, I found it beneficial to learn the intuition behind the algebra, which helped with both memorising and understanding the formulae.

Lectures

1. Short-run macroeconomics (the IS/LM model) - weeks 1–3
2. Labour markets and unemployment — week 4
3. Macroeconomic adjustment (the AD/AS and DAD/DAS models) — weeks 5–7
4. Long-run macroeconomics (the Solow model, endogenous growth model and productivity) — weeks 8–10
5. Open-economy macroeconomics (interest rate and exchange rate regimes) — weeks 11–12

The lecture slides for this subject outline the main concepts but are relatively hollow. This makes them a useful guide for the lecture but insufficient to be read unaccompanied with any further clarification. Fortunately, Mei usually provided a more detailed explanation verbally and visually. The lecture notes were normally completed with clearly labelled diagrams

with necessary annotations. And some skipped steps in algebra derivation were added as necessary in assistance with better understanding.

Mei explains concepts very clearly but at times speaks quickly when she gets into a rhythm. This generally occurred when she explained concepts with a progressive logic, such as the shifts of curves or the movements of equilibriums in the economy. By that point, I found it helpful to preview the lecture notes to familiarise myself with the topics. Or as a second choice, you could try to make a good use of the recording as a supplement to catch up on the missing details.

Tutorials

Tutorials used the blue and pink sheet system (although the blue sheets were not actually in blue anymore). Blue sheet questions were usually easy and straightforward but did give a recap of some of the concepts. They were supposed to be done before the class as a pretute, but some tutors didn't bother checking them. Pink sheets were handed out during the tutorial and the problems in there were much more challenging .

Tutors usually spent 10 minutes to give an overview of the concepts covered in the previous week and spent the rest of the time going through the pink sheet questions. These questions were quite complex which required some tedious algebra, especially in the long-run models. Don't worry if you are struggling to do these problems by yourself when you first get them, as the concepts take a while to sink in. If you understand the solution after the tutorials, you should be fine for the exam.

Online test

The online test (held in week 6) was conducted on the LMS and consisted of 15 multiple choice questions to be answered in 30 minutes. A set of sample questions and answers were provided. The questions covered the first two topics and were relatively similar to the practice ones .

Assignments

There were two assignments throughout the semester, due in weeks 8 and 10. We had the option of working individually or in groups of up to 3 people from the same tutorial.

The first assignment covered the topics of the IS/LM model and the dynamic AD-AS model. The IS/LM questions were relatively straightforward as they merely required us to look up numbers in a report and complete brief calculations. The dynamic AD-AS questions were more challenging which required the skill of using spreadsheet in Excel and plotting time-paths for inflation and output.

The second assignment covered the Solow growth model and human capital accumulation model. Most of the questions were much like the dynamic AD-AS questions from assignment 1, with spreadsheet calculations and time-paths plots. Students found this assignment confusing and much more time consuming than assignment 1. The algebra and derivations were quite tedious and typing out the formulae was a bit annoying. There may have up to 7 or 8 bullet points to be answered in one question but they were structured in sentences. So, what I suggest to do is to highlight them and give the solution of each point separately, which makes your assignment look well-organised and eliminates any possibility to lose marks.

End-of-semester exam

The structure of the final exam was very much like the past exams. The paper had three equally-weighted sections. Section A consisted of 12 multiple choice questions which covered a lot of details throughout the course. Sections B and C had three multi-part short-answer questions each, of which students were required to answer two from each section. The three questions for each section are normally from different topics, while section B questions were more mechanical and section C questions were slightly trickier. However, the tip here is: do not take risk to give up on a whole topic and expect to have the other two questions to do. There can be two questions on one topic, long-run models for example, which happened in our exam.

Another tip that I would like to suggest is the importance of understanding the logic of any derivation. You may be asked to derive new formulae which could be similar to the formulae which have been taught, but with an additional variable or a different parameter. Therefore, it is important that students memorise and understand how to derive the formulae in the course.

Concluding remarks

Personally, I found this course to be quite enjoyable to learn. There is a greater emphasis on using maths to manipulate variables, which may give actuarial students an advantage over other commerce students. Follow up with the course materials and review progressively, and this could be a great chance to boost your WAM.

ECON20001 Intermediate Macroeconomics (2)

Exemption status	CT7 *Business Economics*, in conjunction with ECON10004 *Introductory Microeconomics*. An average of 73 across this subject and ECON10004 *Introductory Microeconomics* is needed, with no fails.
Lecturer(s)	Dr Mei Dong
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour tutorial
Assessments	Tutorial participation (incl Online Tutorial) 10% Online multiple-choice test, set in Week 6 5% Individual assignment, due in Week 8 12.5% Individual assignment, due in Week 10 12.5% 2-hour end-of-semester exam 60%
Textbook recommendation	Blanchard, O. (2017). *Macroeconomics Australasian Edition*. Frenchs Forest, AU: Pearson Education Australia.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2018 Semester 2

Comments

The things that stood out for me were the excellent quality of lecturing by Mei, who engages with students simply by not being monotonous and the well structured tutorial questions. The formula's derivation is clearly explained at a slow pace making the material easy to follow. The most challenging part of the subject, in my opinion, was figuring out exactly how to answer the question to not lose out on marks.

Lectures

Key topics	Weeks
Short run macroeconomics (Simple IS-LM)	1–3
Labour markets and unemployment	4
Dynamic AD-AS model	5–6
Solow model	7–9
Open economy	10–11
Macroeconomic policy and review	12

Mei was quite interactive in lectures, for example mentioning questions raised in previous lectures, highlighting the key points throughout the lectures that kept me attentive. Her annotations were always easy follow and only made the lecture material easier to follow, therefore I definitely recommend actually going to lectures or at least watching the lectures. The topics build on what you would have already covered in *Introductory Macroeconomics*, such as the Solow Swan model and the output equation, and builds on that understanding further. There are many formulas that will be covered in the lectures, therefore it is important to keep track of which formulas were modified in each lecture and why.

Tutorials

Each week, you will get a "blue" sheet to do on your own, that is supposed to be checked every tutorial, and a "pink" sheet that you will cover in class, of which solutions will not be given online. The blue sheet is meant to be easier and the pink sheet will develop your understanding of the lecture material further. Just by doing these sheets every week then maybe when revising solidifies your knowledge quite sufficiently and was an easy way to study the subject for me so I definitely recommend doing these questions diligently .

Assignments

The assignments are pretty straightforward with a handful of questions (9 and 7 when I was assessed) that require you to create models, discuss models, and adjust parameters to observe the effects. Take care with the details to not lose marks in dumb ways however, so spend a good portion of your time to review your work.

Exam

The exam consisted of Section A : 12 multiple choice questions, Section B : choose 2 out of 3 easier short answer questions, and Section C : choose 2 out of 3 harder short answer questions.

The blue sheet, pink sheet, and assignments questions are similar to the exam questions so go over the answers, the expectation of analysis within the answers and the components of theory while revising.

A word of warning, assuming that given there are 6 main topics and 6 questions in total in Section B and C that there is a topic you don't need to study for was proven untrue in my exam .

Conclusion

As with the previous economics subjects you would have completed, this subject is once again well structured, filled with models and formulas, and many helpful tutorial questions so definitely use your previous experience to improve your experience with this one.

ECON20001 Intermediate Macroeconomics (3)

Exemption status	CT7 *Business Economics*, in conjunction with ECON10004 *Introductory Microeconomics*. An average of 73 across this subject and ECON10004 *Introductory Microeconomics* is needed, with no fails.
Lecturer(s)	Dr Mei Dong
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour tutorial
Assessments	Tutorial participation (incl Online Tutorial) 10% Online multiple-choice test, set in Week 6 5% 2 × group assignment 12.5% 2-hour end-of-semester exam 60%
Textbook recommendation	Blanchard, O. (2017). *Macroeconomics Australasian Edition*. Frenchs Forest, AU: Pearson Education Australia.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2018 Semester 2

Comments

Subject content

There are 5 main topics covered in this subject:

1. Short-run macroeconomics (IS/LM models)
2. Labour markets and unemployment
3. Macroeconomics adjustments (AD/AS and DAD/DAS models)
4. Long-run macroeconomics (Solow model, endogenous growth model and productivity)
5. Open-economy macroeconomics (Interest rate and exchange rate regimes)

Lectures

The lecture slides of this subject are quite detailed when combined with Mei's explanation. Occasional, the slides lack a structure as Mei focuses too much on the detail of a specific concept without explaining the main points. The algebra and mathematical proofs shouldn't be difficult for actuarial students and I recommend that students should really take advantage of this through learning the proofs in detail and understanding every step.

There is usually a question attached to the end of every second lecture. This question covers the concepts that were taught, and students should understand them fully as they are quite straightforward. Answers are provided online after class.

Tutorials

Attendance to tutorials contribute to the student's final grade, therefore, students should go to every tutorial. Students are provided with problems on a blue, pre-tutorial sheet to complete at home. These questions are often very simple, therefore, tutors usually don't go over them in class. During tutorials, students are given pink sheet problems, and these are quite challenging in comparison to the blue sheets. The workings-out of the pink sheet problems are not provided. Therefore, it is highly recommended for students to attend replacement tutorials where they can obtain detailed solutions of the problems as pink sheet problems are very important during revision time.

Online test

This is an online test similar to the one in *Introductory Macroeconomics* and is conducted on LMS with 15 questions. Students are provided with sample questions beforehand along with answers. The online test was on the topics of labour market and short-run macroeconomic models.

Assignments

There are 2 assignments during the semester. Students have the option to do the assignments individually, or in groups of 2 or 3. Personally, I completed the assignment individually and I recommend this because it really helps to consolidate the concepts that students have learnt.

The first assignment is on the IS/LM model and the dynamic AD/AS model. Students are also required to use Excel to do calculations and plot time-paths and output graphs. This assignment should be quite straightforward.

The second assignment is on the Solow-Swan Model and its variations. This assignment is comparatively more difficult as it requires students to manipulate formulae and provide interpretation. Again, students are required to utilise Excel to plot graphs and calculate other parameters.

It is highly recommended for students to write more for the assignments. The mark allocations can be very misleading and writing more for each question will increase your chances of getting a higher mark.

End-of-semester exam

This is a 2-hour exam with 15 minutes reading time. There are 3 equally weighted sections (A, B and C), which are worth 20 marks each.

- Section A: Multiple Choice
- Section B & C: Short Answer

For section A, the multiple choice questions often contain many traps, so it is imperative to read and interpret the questions carefully. For sections B and C, students are required to answer 2 out of the 3 questions provided. It is best for students to identify the "best" questions to answer during reading time as this is often the key to obtaining a high score.

Despite Mei explicitly stating that we do not need memorise the formulae, students should not only memorise the formulae but also understand the derivation for each formula. Often, the formulae provided in the exam are insufficient to answer the

question. There are also instances where students are asked to derive a specific formula, which was one of our questions in part C.

Conclusion

This is my favourite subject this year as I considered it as a break from the tedious concepts in *Statistics* and *Financial Mathematics II*. I highly recommend actuarial students to take advantage of your mathematical advantage and understand every single element within the derivations as this will allow you to understand the concepts a lot better.

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 computer lab session
Assessments	4 individual assignments, due in Weeks 3, 6, 10 and 12 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. An orange book of printed lecture slides can also be purchased along with a workbook with exercises from Co-op. The staples are sharp, watch out.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2018 Semester 1

Comments

Subject Content

An important aspect to note as you start this subject is that you can bring one double-sided, handwritten A4 page of notes into the exam. The earlier you start preparing them with useful formulae and notes on theorems, the better. I wrote these with something akin to size 7 font.

An introduction to probability and its axioms — Somewhat a review of the basic probability content covered in secondary school. The subject rigorously covers the fundamentals of probability, defining the axioms of probability. Your cheat sheet should include the axioms of probability.

Probability distribution functions and random variables — You know how in high school, you learn about binomial, and normal distributions? This subject encompasses these distributions, but there are more of them (gamma, negative binomial, etc.)!

This is where the subject starts becoming difficult. The topics of random variables, distribution functions and density/mass functions are explored in depth. It is worth noting down the essential properties which define these functions, as well as the expected values and variances for each unique probability distribution you learn about.

You may find yourself unsure of why you are learning about a certain probability distribution during the semester. At times like these, the innumerable resources supplied by this subject can come in very handy. I found that the easiest way to understand topics was to apply the maths and practice potential exam questions, as Probability is a very application-based subject when compared to *Accelerated Mathematics 2*.

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

Bivariate random variables and correlation — Like the previous section, but with two variables instead of one. Learning the transformations of the random variables can be difficult, so be attentive at these times (week 6). There are several formulae which should be on your cheat sheet.

Generating functions, limiting distributions, branching and stochastic processes — These are arguably the most convoluted areas of the subject, with regards to comprehending them. Thus, it is essential to work through the workbook and consult the recommended textbook as you work through these topics. At the time these topics are taught, the resources for exam preparation should be up. Take advantage of this and see what type of questions they can ask.

Lectures

This year, we were given a choice of two streams, with Mark Fackrell and Aihua Xia as the two lecturers. I had Aihua as my lecturer, and his lectures were funny, insightful and akin to a beacon in the stormy night that is Probability. The pacing of the lectures is manageable for the average maths student, let alone an elite actuarial student such as yourself. Aihua's lectures were my favourite, but I've heard Mark's lectures are more succinct, which might be more suitable for crammers.

As always, maths lectures are worth going to as it is a lot harder to catch up on Probability than your other commerce subjects.

Tutorials

Probability tutorials are like all other tutorials from the mathematics and statistics department, whereby you are given a question sheet to work on as a small group on whiteboards around the classroom for an hour. Then, you have an hour of MATLAB class, where you learn about coding applications for the mathematical models taught in lectures. Whilst these tutorials are not marked, it is highly recommended that you attend as they teach you how to apply the maths. The MATLAB tutorials may seem monotonous at first, but they do teach valuable skills that you'll need for your assignments, and based on past years, some exams.

Assignments

The four individual assignments are spread evenly throughout the semester, in increasing difficulty. The first assignment can be completed with high school knowledge, but don't let that give you a false sense of security. Thenceforth, the assignments become more difficult and require more time to complete. It is therefore highly recommended that you rigorously discuss the themes that appear on the assignment. The assignments are marked differently from other subjects, whereby only two of five questions will be marked, and the other three questions are only checked to see if they have been attempted.

These assignments can include MATLAB based questions that ask you to write a code, so make sure you attend the MATLAB sessions.

End of Semester Exam

The end of semester exam is weighted 80% of your final mark, but it is not a hurdled. To get your actuarial CTs however, you'll want above 73 in Probability.

Luckily, Probability is a subject rife with fantastic resources, including roughly 10 of each: past exams, assignments, tutorial questions, etc. These are released a few weeks before the exam, so stay on top of things and begin doing the exams as soon as possible. This is especially applicable with this subject, as it is an application-based subject and you should be able to see patterns between the past exams; they all have similar questions that reappear every year. As an example, the exams always have one question on probability axioms, one question on bivariate random variables and one question on generating functions. Thus, studying the past exams extensively is your best route to success.

As previously mentioned, you are allowed one double-sided A4 handwritten sheet of notes. Try to squeeze as much information in as possible. Writing the cheat sheet throughout the semester is ideal, however, writing the cheat sheet serves as a good way to consolidate content.

Anyhow, your success in this subject will mostly depend on your preparation for the final exam. Your recipe for success should entail several practice exams, and an in-depth understanding of the possible variants of questions. Good luck!

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 needed, with no fails.
Lecturer(s)	Dr Damjan Vukcevic
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. The lecture notes are quite standalone and covered everything. I didn't need to consult the textbook, however I would recommend it if you want additional questions and more in-depth proofs. Copies are available in the ERC High Use.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2018 Semester 2

Comments

Lectures

Personally, I didn't actually go to the lectures. For the few lecture capture videos that I watched, I found that the usefulness of watching them varied greatly depending on the topic. Listening to the explanation of how to interpret Bayesian inference was very helpful, as it gave me an intuitive perspective on a different inference method to our usual frequentist's inference. This topic, in addition to topics regarding confidence intervals, hypothesis testing and different pivots (like the standard normal distribution) were among the more beneficial topics to watch on lecture capture. Otherwise, the lecture slides were sufficient for learning content. Being a maths subject, and specifically since this is statistics, I found lectures less useful to watch because practising and gaining experience applying concepts was much more important than memorising content.

Tutorials

Statistics, like most other maths subject actuarial students take, has one 1-hour in-class tutorial and one 1-hour computer lab class for R, the programming language. Statistics tutorials in particular are extremely important to attend, as getting experience with different questions will benefit you greatly. Make sure you place these tutorials at a time that you're sure you can be awake for. This subject provides good lecture slides for learning the content, which don't take too long to sift through, so I would highly suggest printing the notes out and reading them on your way to the tutorial, or even during the tutorial.

Statistics is the first time actuarial students learn to use the programming language R. R is not unlike MatLab that we encountered prior to R, but it has many more useful statistical analysis functions, like hypothesis testing and ANOVA testing, which provide information about the likelihood of a test statistic. The lab classes were, as always, not interactive at all, but tutors are present to provide you with assistance when needed. I would recommend completing the lab sheets at home, and going to the lab only if you have questions.

Assignments

As all the assignments feature R components, Statistics assignments, as opposed to previous maths assignments, take even more time to complete. The assignment questions are nevertheless basic when compared to the likes of *Accelerated Maths 2*. The method for the questions can generally be taken directly from either a lecture slide or a lab sheet- use this to your advantage! Don't be too focused on making your R code pretty; it just has to be presentable and functional. Allocate at least two nights to each assignment.

Exam

Statistics allows a double-sided A4 handwritten cheat sheet that you can bring into the exam. This should contain information about a few common probability distributions, similar to *Probability*, as well as the different statistics and their confidence intervals. As with all applied maths subjects, the guide to cramming success is not reading or watching lectures; it is doing all the past exams. The past exams span the range of different questions that they are likely to ask you, and provide a good indicator of your knowledge and ability. Whilst we only received solutions to the previous year's exam, we were given the questions for the past 5 years' exams. Statistics favours repetition and preparation, so make sure to oil the statistical gears before attempting the final exam.

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

Comments

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

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 [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

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

- Week 10: Power & Influence
- Week 11: Organisational Strategy and Structure
- 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:

- 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

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

Comments

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.

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

- **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 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

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	Lecture Notes for Actuarial Modelling 2 (AMII), prepared by Xueyuan Wu. Purchasable from the Co-op store. This book contains lecture notes, tutorial questions, progress-check questions and a specimen examination. Some of the material are uploaded to the LMS following the completion of each topic, so it is ✓ recommended to buy the course reader.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2018 Semester 1

Comments

In comparison to ACTL30001 *Actuarial Modelling I*, this subject took a more practical approach to models that would predominantly be used by insurance companies. There were four major units:

- **Unit 1: Exposed-to-risk (weeks 1-3)**. This explored how mortality rates can be derived from crude data. The crux of this unit was manipulating death and census data using the principle of correspondence and counting days.
- **Unit 2: Hypothesis testing (weeks 4-5)**. This unit consisted of statistical tests to check for adherence of mortality rates (such as those derived in Unit 3) with standard tables. Most of these tests were revision from MAST20005 *Statistics*, with new additions being the exact chi-square, runs, and serial correlations test.
- **Unit 3: Methods of graduation (weeks 6-8)**. Techniques for smoothing crude mortality rates (from Unit 1). The five techniques covered were: Whittaker-Henderson, graphical, mathematical formula, standard table and cubic splines.
- **Unit 4: Markov chains (weeks 9-12)**. This unit began with general revision of Markov chains with the addition of first step analysis and new definitions of communication classes and states. The unit also covered applications to no-claims-discount systems for insurers.

After learning how to count days in ACTL20001 *Financial Mathematics I* and ACTL20002 *Financial Mathematics II*, you may think it is trivial. However, this line of thinking would be disastrous. Here you not only need to count days; but also convert between age definitions and rate intervals and state assumptions as necessary. Timelines are your friend here.

The main things to note from Unit 2 are to remember to differentiate between decisions and conclusions; and memorise the formulae of the statistical tests and whether they are one-sided or two-sided. For instance, the formula for the mean

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

and variance of the runs test is not particularly intuitive.

Unit 3 covers a lot of excel work. Whittaker-Henderson and Graduation by Cubic Splines are generally conducted by a pre-built spreadsheet model. Clearly most of the content in this unit cannot be rigorously examined, but it is still important to memorise the formulae and proofs, as well as the pros and cons of each technique.

The main technique in Unit 4 is first-step-analysis, which is used for a wide range of applications. Another key technique is converting random variables to satisfy the Markov property.

Lectures

Shane delivered the lectures with slides which were for the most part identical to the course reader. He frequently used the document camera, so the only risk of missing out information on lecture capture was in the case where there was no recording. This happened on several occasions this year—usually due to scheduling changes.

Generally, his pace was reasonable and easy to follow. However, sometimes he stuck too rigorously to his schedule so he would rush through a lecture in the final 10 minutes if he has covered other material to begin the lecture.

Tutorials

Even though attendance was not compulsory, tutorials were useful and relevant. Tutorials generally covered relatively easy (but sometimes tedious) questions. In Units 2 and 3, some tutorial questions were Excel based, which were useful practice for the assignment. Full solutions to tutorials and relevant excel files were uploaded at the end of each week, but sometimes these did not contain all the steps. For instance, solutions for Unit 1 would not contain timelines and would rely on confusing worded answers at times.

I personally found tutorials useful for the explanations and reviews of lectures. As with many Actuarial subjects, studious students who do not attend tutorials are not significantly disadvantaged—after all, the solutions are provided each week. However, tutors sometimes impart their experience or shortcuts that may save time on the exam.

Mid-Semester Examination

This exam had two short-answer questions and four multiple-choice questions, covering Units 1 and 2. It is advisable to prepare more for Unit 1 given it is more difficult. The exam format was similar to previous exams, which may have resulted in a median of around 14—unusually high for a subject taken by Shane.

Group Assignment

The group assignment covered Unit 3—Graduation. Students could self-enrol in groups of up to four people on the LMS. The assignment consisted of several short-answer questions on a mortality investigation. Students were required to use Microsoft Excel to calculate crude rates and graduated rates and perform hypothesis testing on these. The assignment was relatively straightforward, but many students lost marks for not explicitly stating certain key assumptions.

Final Exam

This exam was relatively fair. It is important to pay close attention to the final review lecture—several concepts/topics Shane alluded to such as memorisation of graduation formula in Unit 3 and conversion of random variables in Unit 4 came up on the exam.

Solving matrices should be done last as it is very time consuming and prone to errors. It is not necessary in my experience to work with exact answers—using decimals will suffice. Generally, solving by substitution is preferred to Gaussian elimination, but there are times when Gaussian elimination is (unfortunately) necessary. Time should be spent determining which method to use as the wrong decision can be a disaster.

Other Resources

The course reader was quite disappointing. It contained numerous typos, most notably the misspelling of "Exercise" throughout the book. Hopefully next year it will be restructured to make for a better learning tool. The appendix (including the specimen exam) was very difficult to read as it was printed on orange paper. This issue was compounded by fuzzy text in the statistical tables.

Shane created a Microsoft OneDrive notebook which he shared with the cohort. It contained handwritten elaborations on certain lecture slides or tutorial content. It was useful in some cases, but sometimes not so relevant to the course.

Concluding Remarks

This subject was not as rewarding in terms of delving into derivations as ACTL30001 *Actuarial Modelling I*, but still contained many useful and practical skills. It is not taught the best but with enough practice students should find it easier than AMI.

ACTL30003 Contingencies

Exemption status	CT5 *Contingencies*. Satisfactory performance in this subject's end-of-semester exam is needed.
Lecturer(s)	Dr Rui Zhou
Weekly contact hours	4 × 1-hour lectures 2 × 1-hour tutorials There are 2 extra 1-hour lectures in the first week.
Assessments	Group assignment 30% 3-hour end-of-semester exam 70%
Textbook recommendation	*ACTL30003 Contingencies* workbook ✓ The workbook is essential. All the materials are available online as well, so it's a matter of preference.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2018 Semester 2

Comments

Contingencies is a subject which isn't exactly too difficult with mathematical concepts, but rather its broadness and copious amounts of computation, whether it be numbers or algebra. Keeping in mind Contingencies is a double subject, it spans a plethora of topics, and in fair detail as well, making it a very challenging third year subject. It has many similarities to that of ACTL30001 *Actuarial Modelling I*, with both focusing heavily on life insurance. Concepts can be similar, but notation is different.

Perhaps one of the standout things about this subject is how many of the topics, although seemingly different at first, tie together. A concept in an earlier topic can often be explained more thoroughly in a later topic, as the concept re-appears. There is a nice link between most of the topics, and that means holistic understanding is required.

Subject content

Life insurance

This topic makes up the first half of the entire semester's content and is hence the main focus of this subject. It revolves around the idea that although we can find present values of annuity or life insurance payouts, we need to know the expectation of these present values. It covers areas including:

- Finding expectation of annuity or life insurance payouts
- Premium calculations
- Reserving (finding out how much a company needs to set aside to meet benefit payments)
- Differential equations

Joint life

An extension of life insurance, it looks at expectation of benefit payouts given the relationship between two lives. This includes the use of joint distributions; hence adequate calculus skills are required. It is potentially the most difficult of the topics during the semester, but it heavily uses concepts from life insurance- hence, being strong in the first topic is very necessary.

Multi-decrement models

Somewhat similar to the topic covered in Actuarial Modelling I, decrements other than death are looked at. No matrices are used, unlike Actuarial Modelling I. Questions in this area tend to revolve around filling out a table of lives given different types of decrements and mortality experiences.

Pension funds

This topic is potentially the least computation heavy, as it relies more on your intuitive understanding of formulas. It discusses how a pension fund might calculate how much is needed to set aside to ensure it is able to meet pension payments of a worker currently working or a death insurance payment, for example.

Demography

The topic which set itself out very differently to all the other topics, with not too much link to life insurance and expectation calculations. It looks at different types of death rates and birth rates of populations. The smallest topic of the semester.

Discount emerging cost technique

This topic allows a nice tie between life insurance, multi-decrement models and pension funds, as it asks you to look at how much money an insurance company makes or loses year on year on a particular policy. A tedious topic with plenty of calculations, but minimal mathematical concepts. It requires attention to detail and a strong understanding of reserving and how reserving applies.

Lectures and tutorials

Lecture slides are very well written, and Rui covers the topics extremely well, by regularly explaining the same concepts in the slides using a different method. This allows us to better understand a concept by using multiple methods. Pacing is excellent, and it is pivotal to attend lectures or listen to the recordings. Although there are four hours of lectures a week with plenty of content, keep in mind it is a double subject, and hence a single week of missed lectures can put you plenty behind.

Tutorials are very standard, with the completion of questions in class. It is advisable to complete the tutorials before the actual class so you're able to contribute, otherwise it can be very difficult to follow since the questions take a long time to complete. Many questions are provided, but only a handful are selected for tutorial work. The rest is very advisable to complete in preparation for the exam.

Assessment

The assignment was a group work task, and it stepped aside from the content we had learnt in class. It involved research of group self-annuitisation and its benefits. Strong ability to work in Excel, VBA or R is recommended, and a presentation is given in the end. It is a very large assignment considering it is 30% of a double subject. Rui provided plenty of help

during the assignment, so we were able to gauge whether or not our research was going in the right direction. It gave us a strong understanding of another aspect of annuities, and it was extremely engaging to work on.

The actual exam is the key for the exemption, as a low exam mark coupled with a strong assignment or even subject score is not sufficient to pass the exemption. It was a very lengthy exam, but given the depth of the course, it did not cover all the concepts taught, which made it difficult as everything could have been tested.

Tips for Success

Do not leave this subject behind, as it is nearly impossible to catch up on due to the sheer size of the content. Spend time on each tutorial question, even the ones not listed for classwork, and understand the concepts intuitively. Concepts are not difficult, but attention to detail is where many students fall short.

ACTL30004 Actuarial Statistics

Exemption status	CT6 *Statistical Methods*, in conjunction with ACTL40002 *Risk Theory I*. Satisfactory performance in this subject's end-of-semester exam and a satisfactory final grade in ACTL40002 *Risk Theory I* are required.
Lecturer(s)	Dr Enrique Calderin
Weekly contact hours	2 × 1-hour lectures, with additional lectures in weeks 1, 11 and 12 1 × 1-hour tutorial
Assessments	50-minute mid-semester exam in week 7 10% Group 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 PDF version of the workbook (excluding the appendix containing checklists and statistical tables) are available on the LMS. ✓ The workbook is essential, as all lecture notes, tutorial problems and the specimen exam are contained within this book.
Lecture capture	Full (both audio and video)
Year and semester reviewed	2018 Semester 2

Comments

This subject is one of the more applicable and interesting third-year actuarial subjects. It covers a variety of statistical techniques that are tailored to an actuarial context.

Course Content

- Unit One: Introduction to R (3 lectures) — covers storing data in vectors and matrices, associated operations, probability distribution commands, writing simple functions, root-finding and maximum likelihood estimation commands.
- Unit 2: Likelihood Theory (5 lectures) — maximum likelihood estimation and asymptotic properties, likelihood ratio test and Fisher-Scoring algorithm.
- Unit 3: Generalised Linear Models (6 lectures) — exponential family of probability distributions, parameter estimation for GLM and their properties, and measures of model selection.
- Unit 4: Simulation (4 lectures) — Inverse Transform, Acceptance-Rejection, Box-Muller and Marsaglia's polar methods of simulations, required number of simulations.
- Unit 5: Outstanding Claims Provisions (2.5 lectures) — Run-off triangles, Basic Chain Ladder Method, Average Cost per Claim method, Bornhütter-Ferguson Method and variations incorporating inflation and incurred costs.
- Unit 6: Experience Rating Systems (1.5 lectures) — application of Discrete Time Markov Chains to examine the effectiveness and fairness of No Claims Discount systems.

- Unit 7: Time Series Analysis (5 lectures) — Linear Time Series, ARMA(p,q) processes, ARIMA(p,d,q) processes, and forecasting time series with the best linear predictor.

Lectures

Enrique is an experienced lecturer who certainly knows the subject content in and out. In his lectures, he generally annotates a printed version of the slides and expands on the content. While his handwriting is by no means messy, at times it is hard to discern between several characters he writes, namely "n", "m" and "π". Thus, it is recommended that you pay attention before you mistakenly write down the wrong letter.

Like ACTL30002 *Actuarial Modelling II*, the workbook contains partial lecture slides which are to be completed. At times, Enrique's pace is too fast, but thankfully he generally uploads the relevant slides after each lecture.

Do not be alarmed when SWS shows 3 lectures a week for the subject. Most weeks only have two lectures, but Enrique sometimes adds extra lectures (which are all scheduled at the same time) to catch up on content or make up for the mid-semester test.

Lecture attendance is recommended for this subject. Sometimes the desk microphone — Enrique doesn't use the LAV microphone — doesn't pick up everything Enrique says; especially if he turns his back. Thus, context is often useful in capturing the main point.

Tutorials

Tutorials begin in week two and cover material from the previous week. At times, tutorial questions assumed that we knew how to do things before we had covered it (i.e. using the likelihood ratio to construct confidence intervals). Other times, the lectures ran behind schedule and thus, we couldn't complete certain tutorial problems. The main remedy for this during semester was Enrique instructing tutors to ignore certain questions for which he would provide the solutions during lectures.

Tutorials were well-run with a lecture summary at the beginning. My tutor used a Surface Book as a whiteboard which saved time and allowed us to get through material a lot faster than on a traditional whiteboard. My tutor also gave us useful tips for integration among other things.

Assessments

The mid-semester test covered Units 1, 2 and half of Unit 3. We were provided with the previous year's test as practice, which had a similar format. Generally, questions were weighted towards the latter units, with only a few marks devoted towards Unit 1. The best preparation is to complete all previous tutorial problems, the specimen test and be familiar with expressing distributions in exponential family form.

The assignment was released in Week 9 and was quite lengthy. It had two equally-weighted questions; covering Units 2 and 3, and Unit 4 respectively. The assignment was useful for applying all the skills we learnt during the semester. It required judgement, which was not covered during the semester. The crux of this assignment was constructing a Fisher-Scoring algorithm from scratch. This proved to be quite a daunting task for many people with limited coding experience, but it turned out to be a very rewarding experience for those who persevered. The assignment contained several questions

that contained concepts not covered in classes. Thankfully, they were carefully chosen so that we could complete them with some additional research.

End-of-Semester Exam

The end-of-semester exam was a two-hour closed book exam. The majority of the course was examinable, except specific sections that Enrique explicitly stated would not be assessed. Thus, be sure to listen out to what he says is examinable and not.

Preparatory material supplied by Enrique included the specimen exam and the 2017 exam. These, along with the workbook exercises and tutorials and the mid-semester test formed most of my revision material.

The good thing about Enrique's exams is he often gives intermediate results, coupled with "show that"-type questions. This means a couple of things. First, since sometimes working-out for different distributions can be quite messy, so it is easy to check results. Second, even if you do not get the first part of the question, the latter part may still be possible to answer with the information provided in the question.

Concluding Remarks

ACTL30004 Actuarial Statistics is a content-heavy but practical subject. Overall, it is useful to practice and understand the derivations (these can be tested) behind formulae rather than blindly remembering them.

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* subject).
Lecturer(s)	Xiang Cheng
Weekly contact hours	3 × 1-hour lectures Tutorials are held in the place of lectures scattered throughout the semester (5 in total).
Assessments	50-minute mid-semester test in Week 7 10% Group Assignment due in Week 12 10% 2-hour end-of-semester exam 80%
Textbook recommendation	None.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2018 Semester 2

Comments

Models for Insurance and Finance was at times frustrating and challenging throughout the semester but upon reaching the final weeks you could begin to see the thoroughness of the content which gave a well-rounded application of many stochastic processes. MIF is quite different to other third year actuarial subjects in that it more closely follows the structure of a difficult mathematics subject. Expect to rely on various knowledge from *Calculus 2*, *Probability* and *Statistics* when moving through the lecture and coursework as these subjects are all assumed knowledge by this stage of the course.

Initially, the subject appeared dry with no real-world application as you move through defining a random variable in terms of a measure, which in turn means defining a measure and so on. To compensate for the level of depth and difficulty in content, the mid-semester and final exam questions purely relied on understanding the key conditions under which a theory stands (think memorising definitions of various concepts).

This was the first semester that Xiang lectured MIF. He began timidly and at times was confusing, however, he gained confidence, progressing as a great lecturer. Note that the lecture slides contained little when compared with Xiang's additional notes he makes in lectures. Annoyingly, these annotated notes weren't uploaded until the completion of Week 12 but they did contain detailed worked solutions to tutorials, alternate explanations to theorems and plenty of additional examples.

Although, Xiang does provide you with a past student's, Ben Locke's, complete summary notes- however, they do not contain all of the current coursework unfortunately missing out on the final section. These were a helpful additional resource which assisted greatly at the beginning of the subject if you were struggling to understand the lectures.

Lectures

The course was split into three parts. The First "Advanced Probability" extends on knowledge from MAST20004 *Probability*, but begins by introducing key notation and terms. This topic took up roughly half the semester and contained content tested

on the mid-semester exam. Secondly, we moved into Discrete Time Stochastic Processes which extended the first topic's foundations into applications involving martingales. A martingale is, in its simplest form, a stochastic process whose expected value is given by its most recently known value. The main application of this unit is to be able to show that, given a fair game, no playing strategy can achieve abnormal returns in the long run. Lastly, we moved into continuous time stochastic processes. This led to the introduction of Brownian Motion, the continuous analogue of the random walk.

Tutorials

Tutorials were run in lecture time roughly every fortnight. Xiang posted questions around a week before the tutorial and expected students to have attempted the questions before he worked through all questions. Note that only basic solutions are uploaded to LMS and you will have to take down key notes from the tutorial if you wish for a worked solution. (Xiang did post his full worked solutions, sometimes with multiple methods, in the final annotated notes).

In terms of the difficulty of tutorial questions, they ranged from very easy to extremely difficult. You probably won't be able to complete them before the tutorial. However in saying that, you can sometimes view these questions as extensions of the lecture examples.

Mid-semester test

The mid-semester test was relatively straightforward. You must recognise which theorems are important to know definitions for, as some appeared in every specimen and our actual test. Further, the level of difficulty was not extreme and many questions replicated those of lecture examples. Overall, I believe the cohort did relatively well on this mid-sem.

Assignment

Our assignment was a series of 8 questions with many different parts to each question. It was a relatively long assignment, which was expected as it is the only assignment for this subject, however, in a team of 4, the assignment was very manageable. Xiang released the assignment questions around Week 9 and it was due on the last day of Week 12. However, don't be fooled into taking a relaxed approach as the amount of work will catch up to you. I would recommend attempting all the questions that you will be able to work through given your progress in lectures. You will not be able to do it all at the beginning. The questions again were extensions from lecture examples with a few different twists here and there. It is imperative to consolidate your work with group members to avoid any mistakes.

End-of-Semester Exam

It is astounding the level of complexity that some of the topics studied delved into, however, many questions testing said difficult topics were tested at an easier level. In saying that, the 2-hour exam is of reasonable length, but it is important to stay focussed otherwise you will not finish. Many of the questions replicated those of problem sets or tutorial questions. Yet, there were a few challenging extension questions that required a complete understanding of certain topics; namely Ito's Integral.

Concluding remarks

Overall, this subject is very different from other third year actuarial subjects. If you have a strong passion for theoretical maths you will love this subject. If you are the type of person, like myself, who loves maths (hence actuarial) but struggles to wrap their head around maths without many applications and/or isn't intending to complete the Actuarial Honours program (this subject is a pre-requisite for *Advanced Financial Mathematics I*), then I would seriously consider all of your options.

Although this subject was at times very challenging, hard to follow and theoretical, it is a great opportunity to test your mathematical skills built up over your previous years of study. MIF is not an easy subject, but with the right amount of dedication and hard work, (cramming/diligent study) you can achieve a great mark. Good Luck!

ACTL30006 Financial Mathematics III

Exemption status	CT8 *Financial Economics*, in conjunction with ACTL40004 *Advanced Financial Mathematics I*. 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 ACTL40004 *Advanced Financial Mathematics I* are required.
Lecturer(s)	Dr Zhuo Jin
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour tutorial Additionally, there is possibly an additional lecture, depending on content progress/public holidays.
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. Content is also explained in a slightly different way, so it may help further understanding.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2018 Semester 1

Comments

On the surface, almost half of this subject has been covered somewhere in previous years, such as in *Business Finance*, *Accelerated Mathematics*, or *Financial Mathematics II*. However, Financial Mathematics III goes much more in depth about every topic, along with copious amounts of calculations and formulae. This subject has arguably the most content out of your first semester third year subjects, so it is crucial to not fall behind.

Subject Content

This subject focuses on several theories and models that can be used to evaluate the effectiveness and desirability of different investments/portfolios.

- Mean–Variance Analysis: Finding the optimal trade-off between mean and variance. This concept should be familiar from last year's FNCE20001 *Business Finance*, but with much more maths due to more factors that need to be considered. Gaussian elimination and Gram-Schmidt calculations also reappear from MAST10008 *Accelerated Mathematics 1* in this topic when computing covariance matrices.
- **Utility**: Finding the best portfolio to suit individual preferences for risk. An investor's behaviour is represented as a function relating their happiness (utility) to the amount of money they have. Similar to utility in ECON20002

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

Intermediate Microeconomics. This topic also includes geometric means, long term growth, and log-utility.

- **CAPM**: A short topic similar to that of FNCE20001 *Business Finance*, where the expected return on an asset is reliant on its covariance with the market. A new two-factor CAPM is introduced where there is no risk free rate.
- **APT**: Another short topic about the theory of no arbitrage, and how to price assets based of Arbitrage Pricing Theory. Similar to concepts learnt in ACTL20002 *Financial Mathematics II*.
- **Market Efficiency and Rationality**: A theory heavy section explaining different forms and market efficiency with examples.
- **Risk measures**: Previously, risk has always been expressed in terms of variance, but it is not always the best method. The last few lectures introduce a new risk measures – VAR (Value at risk) and expected shortfall.
- **Stock price models across time**: Using log-normally distributed assets to compute the mean, VAR, and variance of a model. ARCH and GARCH processes.

Lectures

Keeping up to date with lectures is highly recommended, either by attending or at least watching the recordings promptly. Zhuo does write extra notes and solve questions on paper in the lectures which help consolidate knowledge, so it is important to take note of those. Overall, he is clear and delivers most of the content off the slides efficiently, though symbols used to represent various variables change throughout the semester, which may cause confusion. In addition, there is a lot of content every lecture, so don't expect to understand and remember everything straight away, and take the time to read and reread your notes to fully grasp all the concepts.

Tutorials

Tutorial questions are set from the textbook, so it is very important to purchase it. The questions are mostly to consolidate knowledge and provide opportunity to become familiar with the basic calculations necessary for each topic. Most of the questions present are easier than exam standards, but there are a few tricky ones that will help you prepare for less known knowledge points.

I personally did not attend the tutorials, which subsequently also meant I fell behind on the course work. Compared to my friends who did go to the tutorials, I was much slower at solving most questions and didn't know shortcuts or the proper method of approach despite many of the questions being fairly formulaic. I regret not going as it definitely impacted my exam results negatively, and cramming is not as effective in this subject compared to those in the previous years due to the large amount of content and depth of knowledge required.

Mid-Semester Exam

This is a standard 10%, 50 minute test given around week 7. 2018's mid semester exam only had 3 questions, testing the first 5 weeks of knowledge, i.e. mean variance efficiency, single and multi-factor models, tangent portfolios, and basic theory about MPT and utility theory. In general the cohort did fairly well, averaging 70-80%. In addition, the questions were all straightforward given proper preparation was done from the textbook, as all the questions were just modifications of existing ones.

Assignment

This is another fairly standard Excel assignment, where the goal is to produce a model to compute minimal variance portfolios, expected returns, standard deviations etc. It is similar to other Excel assignments done in previous subjects. Most groups lost a maximum of 3-4 marks out of 20, as the models aren't too difficult in theory, but needed many formulae and steps to complete.

End-of-Semester Exam

The 2 hour end of semester exam is predominantly calculation based, with only 1-2 questions about theory. However, most of the calculations can only be done correctly given your understanding of the topic, as any detail changed in a question may lead to a different method of computation. From the 7-10 questions, every topic will be covered in some way, so exam preparation should be thorough. Zhuo gave 2 practice exams and answers for revision, and it was mostly a good reflection of the actual difficulty. There is a lot of calculation required during the exam, such as finding inverse matrices, integrals, variances etc., so in addition to sufficient understanding, speed and accuracy is key to finishing on time.

Concluding Remarks

Financial Mathematics III has the most content out of the first semester third year subjects, and it is very important to not fall behind as it's hard to catch back up. This subject was enjoyable in that it brings back a few knowledge points from previous years, so it felt fulfilling to reuse pre-acquired knowledge. Although challenging, I still found Financial Mathematics III to be the most enjoyable out of the third year subjects so far due to its interesting theories that model human behaviour.

Honours and Masters Subjects

Contents

ACTL40002 / ACTL90004 Risk Theory I

Exemption status	Completion of this subject and ACTL30004 *Actuarial Statistics* with satisfactory performance across both will lead to exemption from professional exam CT6 *Statistical Methods*.
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

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

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 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.

ACTL40007 / ACTL90011 Actuarial Practice and Control II [SM2] (1)

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, 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, APC I. 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, APC II 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?

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 APC I may still be examinable for APC II exam as they are highly correlated. Therefore, it's highly recommended that you are familiar with concepts in APC I and bring your APC I 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. APC II 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 APC I, 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. APC II 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 APC 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

APC 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 APC I – they are not isolated courses, but related. Think about the interconnection between the Aims (across both APC I and APC II), 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.

ACTL40010 / ACTL40011 / ACTL90013 Actuarial Studies Projects [AYR] (1)

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	

Comments

Subject content

ACTL40010/ACTL40011/ACTL90013 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/ACTL90004 *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/ACTL90003 *Advanced Financial Mathematics I*.

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.

ACTL40003 / 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.

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

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).

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!

ACTL40004 / ACTL90003 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.

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

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 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.

ACTL40005 / ACTL90013 Actuarial Studies Projects (2)

Exemption status	None.	
Lecturer(s)	Xueyuan (Shane) Wu Shuanming Li Mark Joshi	
Contact hours	3 × 1-hour consultations per project	
Assessments	Project 1 (Semester 1 — Weeks 1–8)	25%
	Project 2 (Semester 1 Week 9–Semester 2 Week 8)	35%
	Project 3 (Semester 2 — Weeks 5–12)	40%
Year and semester reviewed	2017 All Year	

Comments

Mark Joshi: What did you think of your previous projects?
Student: I was surprised we had to do so much research!
Mark Joshi: [laughs] You know, this subject is called *research* projects for a reason.

Welcome to the world of research, and be prepared to have your limits (and stress levels) stretched to new highs by this subject. So far in our actuarial journey, we have rarely had to research too much on our own, or use too much judgement. Following instructions generally ensured a good outcome. However, this subject really pushes you to think, decide, and execute on your own as significantly less guidance is provided.

At the beginning of each project, the project supervisor delivers the project, outlining expectations and tasks. For every project, you will get three consultations with the project supervisor. Questions regarding the projects will only be answered in these three sessions, and will not be answered via email at other times. Each project goes for 8 weeks (with the second project stretching over the winter break), and requires an academic paper style report and usually the code or spreadsheets used in performing the required tasks. All projects require some degree of coding, so this subject is also very valuable in the sense that your programming skills are put to practice.

Project 1

The first project was delivered by Shane, and focused on investigating two aggregate claims models for insurance with dependence. The project consisted of two main tasks: deriving theoretical results for two models such as the mean, variance and covariance, and then using monte–carlo simulation to further compare and contrast the two models.

Looking back at the projects, this project was perfect at easing our way into the subject, and tied in well with our *Risk Theory I* studies since some techniques learnt in *Risk Theory I* needed to be applied. This project was more structured in that the tasks required were clearly outlined, but there was enough room to use our judgement and initiative such as choosing which probability distributions to use, and what sorts of tests to perform when comparing the two models.

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

Project 2

This project was delivered by Shuanming, and similar to Project 1, had an overall *Risk Theory* focus. Nonetheless, immediately from the outset of the project, it was apparent that a lot more research would be required for this project. The focus of the entire project was on copulas (a method to model dependent random variables), and none of us had ever heard of these before! Hence, before we were able to even start the tasks, extensive research went into understanding what they were. The remaining parts of the project focused on fitting various data to bivariate distributions using common distributions and copulas, ultimately leading to a comparison of the methods and fit.

Project 3

The final project was delivered by Mark Joshi. Very much like his financial mathematics assignments, the project started with a similar background story where we were an analyst and our boss required us to complete a task. For our project, the task was to create two models (one basic and one enhanced) that would calculate the price of an exotic basket option called the *South Guarantee* (a product which prevents your investment from going south) and compute the Greeks. Six test cases were provided, and we were expected to perform our own tests as well. Sound straightforward? The catch was that our bonus (i.e our project mark) would depend on how quickly our enhanced model could run compared to our basic model. Mark warned us that he would be very unimpressed if we purposely made our basic model exceptionally inefficient.

Compared to the other projects, this project was the most open ended, and really challenged us to develop some programming skills and think about how we could make the model more efficient. At the same time, we were expected to be able to understand and explain how the techniques used to accelerate our code worked, so the project had a good balance between theory and application.

Tips for Success

Looking back over the year, the biggest factor that determines how successful you are, and how well you manage your stress is how early you start the projects. Often, many students would not start them until three or four weeks into the project which would lead to cram sessions in the final week that the project was due. Often such cramming led to sky–high stress levels and the need to skip other lectures, which is not recommended.

When writing up the report, the look and way the report is written also carries more weight than what you might first expect. Hence, time should be taken to proof-read and think about how the report will be structured. LaTeX is preferred, and it is rumoured that a mark is deducted for every two typos. Finally, a reminder that initiative will be rewarded and the more you put into the projects, the more you will get back — both in the form of being more work ready, and your subject mark.

Whilst the projects are tedious to complete throughout semester, there is no doubt that we will look back later and realise that the projects have taught us many skills that are transferrable when we enter the workforce. Good luck, and start the projects early!

ACTL40006 / ACTL90010 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;

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

6. Enterprise Risk Management;
7. Risk assessment frameworks;
8. Product design;
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, APC1 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.

ACTL40009 / ACTL90009 Actuarial Practice and Control III [SM2] (1)

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 / ACTL90009 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 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.

ACTL40007 / ACTL90011 Actuarial Practice and Control II (2)

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?

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

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?

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.

ACTL40008 / ACTL90015 Mathematics of Finance IV

Exemption status N/A; this subject does not constitute any exemption requirement but is instead an elective upon satisfactory completion of ACTL40004 *Advanced Financial Mathematics I* (which comprises part of the exemption requirement for CT8 *Financial Economics*).

Lecturer(s) Professor Mark Joshi

Dr Dan Zhu (Mark's former PhD student) took the last 3 lectures due to Mark's passing

Weekly contact hours 2 × 1.5-hour lectures

Assessments

	Honours	Masters
Mid-Semester Exam (Week 7)	20%	20%
Group Assignment due in Week 7	—	10%
2-hour Final Exam	80%	70%

Textbook recommendation Joshi, M. S. (2008). *The Concepts and Practice of Mathematical Finance* (2nd ed.). Cambridge, UK: Cambridge University Press.

✓ The textbook is essential, as exercises are taken from there.

Lecture capture Full (both audio and video).

Year and semester reviewed 2017 Semester 2

Comments

***Disclaimer**: Note that all the comments in this review pertain to the subject when it was delivered by Professor Mark Joshi, who has unfortunately passed away.*

Mathematics of Finance IV is the pinnacle of financial mathematics subjects offered by the University of Melbourne. While the *Financial Mathematics* pentalogy has been relatively theoretical, MoF4 also gets into how each of the concepts are actually applied in practice. Get ready for the most rewarding subject that the Actuarial Department has to offer.

Subject content

MoF4 extends on the content covered in MoF3. There is no official breakdown of overarching topics, but the content can be loosely categorised as follows:

No Arbitrage and Binomial Trees — The principle of no arbitrage is introduced once again, as well as a slew of other theorems that follow as a consequence. An in-depth discussion of trees follows, talking about different types of trees (including one where the stock is used as numeraire), and a number of techniques that are used to "accelerate" computations using trees.

Continuous Time Martingale Pricing — All the content from *Models for Insurance and Finance* and MoF3 is very briefly revised. We learn how to price options through stochastic differential equations when the stock is used as the numeraire

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instead of the bond, before learning the analytic formula for the price of a barrier option — an option that only pays off if the stock reaches (or does not reach) a certain value before the option's expiry. In MoF3, you would have learnt that you can change the drift of a Brownian motion when passing through another measure. Here you learn exactly how that is achieved through the use of the Radon-Nikodym derivative.

Multiple Sources of Risk — up until now, the only source of randomness included in a model was a single Brownian motion (or a single random variable per step in the discrete case). Here, a model which incorporates a multidimensional Brownian motion is introduced, allowing us to price more complicated options (such as one that allows us to trade two stocks at some future point in time). *Linear Algebra* starts to become a huge part of the course from this point moving forward, so brush up on your first year mathematics notes.

Interest Rate Derivatives and Market Models is an extremely large topic of the subject, consisting of 7 of the 22 "content" lectures. Some derivatives depend on a set of interest rates in the future. This topic focuses on how we can use Monte-Carlo to price these derivatives. Among other things, the drifts of the forward rates in a variety of martingale measures is derived, before a very lengthy discussion on how the implement a market model.

Jump Diffusion Models — In history, there have been a number of crashes in the market, causing jumps in the prices of stocks. All models studied up to this point have assumed that such jumps don't occur. Jump Diffusion Models attempt to model these jumps through the use of a (compound) Poisson process. What impact does including this possibility have on the price of an option?

While it initially starts off as a theoretical maths-y subject, the Market Models lectures starts blurring the lines between a maths subject and a computing subject, where *computational complexity* (i.e. how the length of time it takes for a program to run something scales in relation to the number of inputs) becomes a heavy focus. Any programming experience would be a huge boon for this subject.

Lectures

Slides are released in quarterly chunks, and lectures are delivered as two 1.5-hour lectures in a week. One of the lectures is replaced with a mid-semester test (held in week 7), and there is only 1 lecture in the final week (or at least that was what was initially planned).

Lectures would usually consist of going through slides, and proving any results that were in slides on the whiteboard. This meant that listening to lecture recordings was not very helpful at all, as most of the stuff not on slides was not recorded. Mark expected lecture participation from students, and even went out of his way to include students who didn't usually contribute in lectures.

On the second lecture of each week, the final 30 or so minutes was dedicated to working through problems that students wanted to go through.

Mid-semester exam

As is standard in Actuarial Subjects, a mid-semester exam is held in week 7. Only one past mid-semester test was provided.

2017's mid-semester test was a lot more computational than I had expected to come from Mark. In hindsight, none of the questions were too hard. However, time was a huge issue due to the computational nature of some of the questions asked.

A common pitfall students made was trying to be overly clever and "simplifying an expression" before applying a certain technique, which actually made it more complicated instead, and failing to divide the payoff of the derivative by the numeraire.

Assignment

A group assignment was released at about Week 5. It involved simulating a hedging strategy on a stock, varying the hedging strategy as well as the model volatility of the stock. Students were required to make observations on how the trading strategy in relation to the model volatility affected the profit (or loss) made by the trader.

It goes without saying that programming was essential to the assignment. The "answers" (i.e. which scenarios resulted in profits and losses) was made apparent in lectures, so it was simply a matter of making your code produce results that match the results shown in lectures. One interesting thing to note is that the write-up required concepts that were taught in MoF3 rather than MoF4.

I believe all groups scored full marks for the assignment.

End-of-semester exam

Two past exams were provided with solutions. The format of the past exams were very similar: 6 questions each worth 10 marks regardless of difficulty/time required. There was always an essay question.

Our exam changed the formula up a bit, and was consequently a lot harder that previous exams. 7 questions were on the exam, each worth 10 marks. Instead of a single question dedicated to essay writing, there were about 3 sub-questions spread throughout the exam that required students to write either a proof for a result shown in lectures, or an explanation of how to implement or accelerate a certain algorithm.

No question on the exam was a "free mark", as is typically the case in every other exam. In hindsight, the most important thing to know for the exam was the **black formula**, and how exactly to use it to answer questions.

The exam was heavily scaled upwards.

Tips for Success

A lot of what is taught in MoF3 is very computational, so the best way to learn about the content is to actually implement them in a programming language. Most students are familiar with R, but you can use whatever language you want, as long as you are implementing what is taught in lectures. This topic is especially true for the Market Models topic — even if you don't implement it correctly, being able to see the general structure of how it would be coded will help immensely.

Closing Remarks

Unfortunately, due to the passing of Mark, I'm not entirely sure if this subject will even be offered in 2018, which is a huge shame. However, I sincerely hope that it continues to be taught. The lecturer that takes it will have huge shoes to fill, and if they are even half as good as Mark was, then I am confident that it will be taught well.

Rest in Peace Mark — you will be missed...

ACTL40009 / ACTL90009 Actuarial Practice and Control III [SM2] (2)

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, Course Texts & Extracts, and Student Course Notes Investment Bridging Course Notes is uploaded onto the LMS. This reading is not absolutely necessary, but provides good background knowledge for any unfamiliar topics. The other two readings are available at Co-op, and ✓ are recommended.
Lecture capture	N/A
Year and semester reviewed	2017 Semester 2

Comments

This subject is very different to any subject we have done so far! Sounds familiar doesn't it? However, APC3 is yet again different to even APC1 and 2. It might take a few lectures, or weeks, or possibly even until very late into the semester before you realise what the subject is trying to convey. Rest assured that this is not your problem, and just the way the course material is designed and delivered. The climax of the subject is the last two lectures where everything should come together.

Unlike APC1 and 2 where the course content is based on aims, APC3's content seems very scattered at first, much like individual siloed topics. Broadly speaking, the course can be broken down in the following way:

- Introduction which challenges the way we think about investments, models, and asset return estimation. Essentially, is what we often use/think up until now actually justified?
- Toolkit where the characteristics of various asset classes (debt, property, equity) are discussed. Models and their arguments for and against are further discussed.
- Climax where we think of ourselves as senior actuaries estimating the long-term asset returns

Lectures

Overall, Kevin's lectures varied in clarity. Some lectures were very easy to understand; however, key concepts were often difficult to identify in many lectures. He also seemed to assume that we had more knowledge than we did. Certainly, many of us will have learnt about basic investment ratios in ARA, however, it is unlikely that many of us really retained much

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of that knowledge. It also did not help that lecture slides were very bare, often being heavily abbreviated. The first few lectures were especially difficult to follow due to the amount of investment jargon used. As a result, many students found it useful in these first few lectures to refer to readings as a way of identifying key points before then revising the lecture notes again. Some also found that the first few lectures only really made sense after the entire semester's material was taught and revised. Having said so, Kevin is very receptive to students' feedback, and is very willing to take onboard feedback throughout semester, and this was much appreciated.

For our semester, Kevin included specimen exam questions at the end of each lecture to give us an idea of the type of questions that could be asked in the exam. Sometimes these questions were attempted in class, and Kevin gave us feedback for our answers.

Workshops

Every week, there is also a workshop (unlike other honours/masters subjects). The workshop questions are contained in one of the reading packs, and answers were uploaded onto the LMS following the workshop. Overall, many of the workshop problems are very fluffy and open ended. Consequently, the answers were often also wishy washy and could be whatever you wanted it to be as long as you could justify your reasoning. Attempting the workshop problems is highly recommended as it gives you practise at forming your own opinions and justifying your reasoning. Having said that, since many of the lectures were very confusing, some students found the workshop problems hard to access at first, so try to give it your best shot!

Assignment

The assignment was an individual assignment where we were required to provide a buy/sell/hold recommendation for an allocated stock and other peer stocks after researching the company's financial position and performing fundamental analysis. This assignment is only compulsory for honours and masters students, and is optional for distance education students. Having said that, this assignment provided excellent practice for calculating the key yardsticks learnt in earlier lectures, and really helps one familiarise themselves with commonly used investment jargon. Since we were required to consider financial reports, we were also challenged to see all the possible areas where judgement was required, and how fundamental analysis is itself also an art, and not exact science. The assignment also allowed us to appreciate some of the points made in the first few lectures.

In terms of timing, the assignment was due towards the end of semester, which coincided with the deadline for the APC2 assignment (and IRM2 assignment for masters students). The assignment was uploaded before the mid semester break, so using your mid sem break wisely is a promising idea.

End-of-Semester Exam

The exam is 3 hours, with 15 minutes reading time. It is a closed book exam, unlike the other APC subjects. Since it is closed book, it is recommended (and expected) that you have a basic idea of market rates such as the overnight cash rate, 10–year bond rates, swap rates etc. During SWOTVAC, there is one specimen exam provided, and the rates you are expected to know is also provided.

Overall, the specimen is similar in format to the final exam, however, the length of the specimen was relatively shorter. To our surprise, the specimen was a compilation of the specimen exam questions provided at the end of each lecture and

some workshop problems. In terms of the final exam, it was very long (14 questions with sub questions as well), and most students did not finish. In preparation for the exam, re-attempting tutorial questions and specimen exam questions seems promising. The exam was a similar difficulty and style to these questions. Be prepared to justify your answer as there was often no one correct answer.

Tips for Success

Students should walk into this subject with an open mind, and not expect to rote learn the subject. Understanding what investments there are, and how the investment markets work is helpful, so it may be worthwhile taking time at the start of semester to consider these fundamentals.

If you ever feel lost as the semester progresses, referring to the readings may provide some direction. Forming a study group to discuss concepts, or taking down your own notes throughout semester could also be an efficient way to study for the subject. Nonetheless, regardless of how you choose to study for this subject, it is imperative to practise communicating and justifying ideas. It is important to realise that this subject is one where there is no right answer. Also remember that investment assumptions will depend on the objective and timeframe. Good luck!

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.

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

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

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

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

- The arbitrage pricing model
- Market efficiency and rationality
- Brownian motion and stock price models across time

Lectures

The lectures were all recorded with full audio and video. In the notes printed off the LMS, some sections were left blank for us to fill out during the lectures. Personally, I found the lecture pace slow but the content was well taught and explained 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 [SM2]

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.

- 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 videos (adding up to roughly 1 hour) 1 × 1-hour workshop 1 × 1-hour tutorial
Assessments	1-hour minute mid-semester test, held in Week 7 — 20% Individual assignment, due in Week 7 — 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. ✗ 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	Online lectures are uploaded well in advance. Workshops are not recorded.
Year and semester reviewed	2018 Semester 1

Comments

Overall this subject was a really interesting introduction to life insurance. The content was quite challenging and there are a lot of formulae to memorise. The prerequisites for this subject are *Probability* and *Statistics*, and it is super important to have learnt and understood both of these subjects to do well in Life Insurance I.

Subject content

Life Insurance I is all about modelling mortality. This will be the first subject in the Master of Actuarial Science course that focuses more specifically on actuarial science rather than finance or general statistics.

This subject is broken into six sections.

1. **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 a relatively long section with several formulae to memorise. It is very important to understand the proofs and derivations to these formulae as they are assessable.
2. **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.

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

3. **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.
4. **Multiple state models** — This section really requires techniques taught in some of your previous subjects , such as solving differential equations. We extend on the concepts taught in the previous section on the Two-State model of mortality to multiple states. The techniques for solving the differential equations are fairly standard and although they look extremely difficult and fiddly at first, the steps to solve each differential equation in this section are very similar, so understanding the basic ones really help you solve the equations for the more complex models.
5. **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. It is definitely worth memorising the probability density functions and cumulative functions of these distributions as there is no formula sheet provided in the exam.
6. **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 in bite sized chunks of three to four minutes. They were uploaded weekly and we were expected to keep up with them in our own time. The lectures lasted about an hour in total per week, but I found myself spending an hour and a half to two hours on them each week. Although the content in the lectures follows the lecture notes extremely closely, sometimes David will briefly cover ideas not in the notes, so I highly recommend watching the videos. This was especially true in the last section on simulation where he drew a graph to help explain concepts that was not in the lecture notes.

Workshops

Instead of lectures, David runs weekly workshops. This semester, at the beginning of each workshop, he trialled a new mini quiz. 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. I really enjoyed these short questions as they gave me a gauge of what was expected of me at that point in the semester and how far behind everyone else I was. Unfortunately, these quiz questions were not uploaded onto the LMS, so if you get stuck on any of the questions or do not understand the solutions, copy them down for your own reference. After the quiz, we then went through one or two workshop questions as a class. These questions were uploaded to the LMS along with the solutions at the end of each week.

Tutorials

The tutorials were fantastic. 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. Furthermore, sometimes our tutor also gave us a third way to look at the problem and solve it. This was especially nice with the proof questions where some proofs or derivations for the same problem were easier to understand than others.

Assignment

The assignment was an individual assignment in Excel. The first part to the assignment was plotting the Kaplan-Meier Estimate and the second part was finding the mortality rate in the binomial model of mortality. This assignment was not marked purely on finding the correct answer, points were also given for presentation of the excel workbook and the written submission. I highly recommend using LaTeX for this assignment . I had never used LaTeX before this semester and picked it up easily for this assignment. If you do choose to use Word, make sure your subscripts are subscripts and superscripts are superscripts. In our feedback for the assignment, David focused on attention to detail.

Midsemester Exam

The midsemester exam was held in week 7 and covered Section 1 and all of Section 2 except proportional hazards. There was a mix of computational and theory questions.

Personally, I found the exam extremely unexpected although looking back now, most of the questions were standard. Many questions were just slightly different to what we had previously come across, and I, along with many classmates I talked to, thought it was much harder than the 2017 mid-term exam which was provided as practise. Fortunately, we were given enough time (60 minutes) to do the exam but there was no difference since I didn't know where to start for far too many of the questions. The mid-term really emphasised how important it was to understand the concepts deeply rather than to just know how to blindly apply formulae.

A good reference for additional questions is the recommended textbook. One of the questions in the mid-term exam which we had not previously seen in any problem sheet, tutorial sheet or workshop question was an exercise in one of the chapters from the textbook.

At the end of each chapter in the lecture notes, David outlines his expectations which should also be carefully reviewed during the revision for the mid-term exam.

End-of-Semester Exam

I found the end of semester exam much better than the mid-term exam. There were fewer surprising or unexpected questions. The paper covered the whole semester's content and not just the second half. Overall, I think the time given and paper length was well balanced, although you had to work consistently without stopping to recall formulae to finish in time. This exam was not as long as some other actuarial exams I've sat but it was definitely not cruisy either.

In your revision for the exam, problem sheets, tutorial sheets and workshop questions are your best friend. I found many of the questions in the exam were written in a similar style to these questions. Unfortunately, these sheets do not cover the many proofs taught throughout the subject, so I would recommend looking over these in the lead up to your exam since almost all proofs are examinable. One piece of advice given to us by David was to write down the proofs rather than just reading over them and that really helped me, especially the section on the Poisson Process. The proof and derivation questions required in the exam were ones that I had scrawled probably ten or so times in the weeks before the exam and if I had not done that, I reckon I would not have had enough time to finish the exam.

Concluding remarks

Overall, I really enjoyed Life Insurance Models I. The subject was extremely challenging and covered a lot of ground, but the concepts were interesting, and the mathematics was fun.

ACTL90007 Life Insurance Models 2 [SM2]

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 2. 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 2 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

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

covers the advantages and disadvantages of each method.

Unit 4: Stochastic processes This unit is not related to mortality rate modelling and felt disjoint from the rest of the subject. Markov chains are studied in depth and there is a brief introduction into new stochastic processes such as the Compound Poisson Model and White Noise.

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 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.

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?

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

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 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.

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

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

models and more are touched on here, each of which relies on a different aspect of the claim handling process, and an explanation as to when one may be more appropriate to use than another.

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

Breadths and Electives

Contents

BLAW10001 Principles of Business Law [SM2]

Exemption status	None.
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 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]

Exemption status	None.	
Lecturer(s)	Professor Tim Baldwin Nic Geard Marion Zalk Guest lecturers	
Weekly contact hours	3 × 1-hour lectures 1 × 1-hour tutorial 1 × 1-hour workshop	
Assessments	Online worksheets on Grok due throughout the semester 45-minute mid-semester test in Week 6 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	2018 Semester 1	

Comments

Subject content

- Weeks 1-9: Python
- Week 10: HTML and the Internet
- Week 11: Algorithms
- Week 12: Exam revision

Foundations of Computing assumes no prior coding experience. This semester used Python 3.6 but use of Python 3.0 was acceptable for assessments. The subject used worksheets on an online platform, Grok Learning, to aid with the teaching of Python content. I found that the Grok worksheets were better for learning than lectures as they explained concepts in interesting ways and the questions tested your ability to apply what you may have just learnt. As more ideas were introduced, many of the problems required knowledge of previously taught concepts. The consistent practice meant that I had used the concepts so much that they became second nature. I found the theory taught on HTML and the internet and algorithms quite interesting. Guest lectures were also very interesting, but the technical concepts were often hard to understand.

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

Lectures

There were two lecture streams for the three 1-hour lectures. Lecture slides were usually uploaded a few days before the lecture. They tended to be quite short with basic definitions and explanations, and some sample code. During the lecture, the lecturers often demonstrated the sample code or wrote more code in a browser. This was usually captured by lecture capture, so students don't miss out by not attending in person. Lectures which taught Python are not too important since the content can be learnt from Grok, but lectures for the rest of the semester are worth attending or watching.

From week 3, one lecture every second week was a guest lecture. Guest lecture slides were uploaded after they had presented since the content was also examinable. I recommend attending them since the guest lecturers are passionate about their respective areas, which makes it easier to remember the content. Every other week had a revision lecture and an advanced lecture running at the same time. The revision lectures were more like consultations while the advanced lectures taught extension work that was not examinable. There's no need to attend these lectures if you're comfortable with the content and not interested in advanced computing concepts.

Tutorials

Tutorials consist of two parts – a one-hour traditional tutorial and a one-hour computer lab workshop. There are no attendance or participation marks, but my tutor had us sign an attendance sheet anyway. He implied that if someone just missed the hurdle for the projects and worksheets component, frequent attendance might get them that extra mark or two.

During the first hour, a tutorial sheet is handed out and students are given some time to attempt the questions before they are discussed and explained. My tutor tried to encourage us to talk to each other and solve problems together, but the effect was limited. The tutorial sheets provided practice for coding on paper and the questions were often similar in style to questions on the mid-semester and final exams. Occasionally, there would also be harder problems or extension problems at the end and I found these hard to complete in the limited time available. Solutions to the tutorial sheets were uploaded to the LMS within the next week.

The second hour is a computer lab workshop in which students can work on Grok worksheets or the relevant project. The tutor and a demonstrator are available to help if you are struggling or want to discuss harder concepts. Although I never asked for help, I went along anyway to allocate a specific hour to Grok and being surrounded by students working on the same thing helped me stay focused.

Assignments and assessments

There are three individual projects that contribute 10% each and 16 Grok worksheets that are worth 10% altogether. There is a hurdle of 50% in the projects and worksheets; that is, you must score at least 20/40 to pass the subject.

The projects consisted of 4-5 individual questions and were marked out of 10 for the code itself, adherence to style and usefulness of comments. Projects were released 2-3 weeks before the due date to provide enough time to complete them. It's important to make use of this time as it takes time to think through why you're stuck or to find and solve any bugs that arise. A practice project was available on Grok so that students could know what to expect but it wasn't marked.

In this semester, Project 1 required two simple functions and the remaining three questions were components of a system that analyses a document and determines the author; Project 2 involved 3 functions to validate plays for a board game and the final question asked for test cases for the functions; and Project 3 entailed validating plays for a card game and writing a program that could play the game, which competed against other students' programs in a tournament. Project 1 was

quite easy and marking on the style and comments was lenient, so 10/10 was common. Project 2 and 3 were significantly harder. It took a while to understand the rules of the games and then figure out how to turn them into code. Project 2 offered a bonus mark to students whose test cases could accurately detect incorrect submissions in a previous question. Project 3 also offered bonus marks through writing a program that could make a play for a modified version of the game. Overall, the projects can be quite time-consuming. I didn't put effort into finding another solution that could make my code more elegant or attempt the bonus question in Project 3; I felt that the time required to possibly gain an extra mark or two was better used elsewhere.

The worksheets were fairly easy and provided good practice. Two or three worksheets were due each week to correspond with the content taught in that week. Doing all 16 worksheets on time is an easy way to guarantee 10%. A 17th worksheet was made available in week 11 for bonus marks (completing all of the worksheet 17 questions would have led to an extra 0.75 marks). It focused on data science and the content was not examinable.

Mid-semester test

The mid-semester test in week 6 was a 45-minute closed-book paper examining content up to the end of week 5. There were 5 questions in the paper, for a total of 45 marks. A sample test and a past test was uploaded to the LMS. The sample test was explained during a lecture and solutions to the past test were available on the LMS. The structure of the paper was consistent with the resources made available. However, the paper in this semester seemed harder. It wasn't hard to pass, but it wasn't easy to do particularly well in either.

Final exam

The final exam was a 120-mark paper that ran for 2 hours with 15 minutes of reading time. There is a hurdle of 50% in the mid-semester test and final exam. Numerous past papers were available on the LMS but I only did those from the past 3 years since older exams were based on older versions of Python. A sample paper with only 60 marks was also uploaded and used as an example for the revision lectures in week 12.

The final exam was very similar in structure to the past papers and the difficulty was similar. Like the mid-semester test, the final exam tests coding on paper, but it also tests theory. The theoretical questions can be tricky as the scope is not just weeks 10-11 and guest lectures – we were asked very basic concepts about Python that were mentioned in the first couple of weeks.

The best preparation for the final exam is consistent practice throughout the semester, by completing Grok worksheets and tutorial worksheets. This will help with understanding unfamiliar code quickly and writing code for new problems more easily. The small amount of theory can easily be memorised.

Suitability as a breadth

Foundations of Computing is a popular breadth for actuarial students. The subject helps to develop problem-solving skills and a methodical approach to breaking down complex problems. I highly recommend this subject if you have little or no experience with coding and enjoy being challenged by logic problems. I would say that it's easier than your average commerce subject and, if you find the content interesting, the work for this subject can be used to procrastinate what you need to do for your other subjects.

Concluding remarks

Hard work pays off in Foundations of Computing. Consistency during the semester is particularly important to doing well overall. The subject content is interesting and makes for a great breadth choice.

COMP20005 Engineering Computation [SM1]

Exemption status	None.
Lecturer(s)	Professor Alistair Moffat <3
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.

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

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 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]

Exemption status	None.
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. 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 [SM2]

Exemption status	None.	
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.

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 [SM1]

Exemption status	None.
Lecturer(s)	Dr Reshad Ahsan
Weekly contact hours	2 × 1-hour lectures 1 × 1-hour tutorial
Assessments	Tutorial attendance and participation 10% Online multiple-choice test held in Week 6 10% 2 group assignments due in Weeks 5 and 9 2 × 10% 2-hour end-of-semester exam 60%
Textbook recommendation	None needed. The lecture slides are ample study material.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2018 Semester 1

Comments

Intermediate Microeconomics is more or less a bludge subject for actuarial students. Therefore, it is a good option to take as a Commerce elective for those set on the path of actuarial studies. Compared to your other second year subjects, this one will feel somewhat like a breeze, and you will likely feel like you're not learning anything new from week to week. If you think you would enjoy a more calculus/maths focused version of *Intro Micro*, then this subject is for you.

Subject Content

Supply and demand (Lectures 1 and 2) — A review of *Introductory Microeconomics*, which covers basic theories taught in first year.

Consumer preference (Lecture 3 to 6) — An in-depth look at optimal baskets of utility through indifference curves and budget constraint.

Individual demand (Lecture 7) — Income and substitution effects; the impact on the optimal basket if income changes.

Consumer preference over time (Lecture 8) — Consumer choice while factoring in inflation over time.

General equilibrium (Lecture 9 and 10) — What happens when two firms' prices of two goods affect one another? A look into Pareto efficiency and Edgeworth boxes.

Uncertainty (Lectures 11 and 12) — Consumers' preferences based on expected values of risk-taking baskets.

Production functions (Lectures 13 to 18) — A deeper look at firm profits, revenues and costs taught in Introductory Microeconomics.

Monopoly and oligopoly firms (Lectures 19 to 22) — Price setting and social costs with monopoly and oligopoly markets.

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

Review (Lectures 23 and 24) — A review of selected lectures in the semester.

Lectures

Whilst I attended a sparse number of lectures, Reshad made it very clear from the outset that he would make the lecture slides as self-sufficient as possible. This ended up being the case, as the lecture slides themselves were enough to teach me the whole course, with added examples.

The concepts taught in this subject are in general simple enough to understand without having to attend every lecture, however, it is still best that you attend. That being said, I did resort to the lecture capture whenever there were more confusing elements of the subject, wherein the slides themselves weren't sufficient, but this scenario was rare. Whilst I did not attend many lectures, it did not affect my progress, as lecture slides were sufficient when it came to learning content.

Tutorials

Similar to first year *Introductory Microeconomics*, the tutorials are marked for both attendance and participation, including pink and blue sheets for your revision. My tutor was charismatic and a clear explainer of the economic concepts and kept me on top of things throughout the semester. At the beginning of your 1-hour long tutorial, you'll receive a pink sheet of a few questions to attempt with your peers, for in-class reviewing before the end of the hour. These questions serve as a good indicator of your success in the subject, so, participate and complete all the worksheets, as they are valuable resources at your disposal. My pre-tutorial work was not marked, but that might not be the case for all tutorials.

Assignments

The two assignments were distributed with ample time to complete them. They both had only one or two questions; extended questions, however, with multiple parts to each. These assignments weren't exceptionally difficult, and with solid calculus skills, you should be fine. Give yourself a few days to attempt them, as they can be monotonous and filled with "reading comprehension". As previously stated, the assignments are both group assignments, with a maximum of four people per group, and only with people from your tutorial class. Therefore, I would highly advise that you sign up for this subject with good (smart) friends in the same tutorial group.

Mid-semester test

The mid-semester test, or as they like to call it, the "within-semester test", is a simple ten-question online multiple-choice test that should take about 20 minutes to complete. The questions are each simplistic, and honestly, without any second-year knowledge, you should be able to figure the answers out. The questions of your online test will be slightly different from other people's, but don't ask me how I know. With sufficient preparation, this online test should be a pebble on the side of the road.

End of semester exam

The two-hour exam at the end of the semester may be daunting at first, but you'll be missing this subject's exam as soon as *Probability* rolls around. Just like in first year, the final exam is split into three sections: sections A, B and C. Section A

is a ten-question multiple choice section, where each question is worth two marks each. Sections B and C are both worth 40 marks each, and each contain two extended response questions. The exam was very similar to the past exams, in that for sections B and C, the number of unique questions they could ask is pretty much equal to the number of questions they actually ask. That is to say, with good revision and attempts at the past exams, you'll find this exam a breeze. For my exam, even just between sections B and C, the questions were repetitive.

Exam preparation should entail completing the two past exams they give you and checking solutions afterwards. If that's not enough, then complete all the tutorial questions. With an adaptable intellect, this subject is conquerable. Best of luck!

FNCE20002 Management of Financial Institutions [SM2]

Exemption status	None.
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 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)

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.

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]

Exemption status	None.
Lecturer(s)	Professor Chander Shekhar
Weekly contact hours	1 × 2-hour lectures 2 × 1-hour tutorial
Assessments	Mid-Semester Exam in Week 8 20% Tutorial Participation 10% 3-hour end-of-semester examination 70%
Textbook recommendation	Peirson, G., Brown, R., Easton, S., Howard, P., & Pinder, S. (2014). *Business Finance* (12th ed.). North Ryde, AU: McGraw-Hill. See Textbook Section below for more comments.
Lecture capture	Full (both audio and video).
Year and semester reviewed	2018 Semester 1

Comments

This subject is a core subject that leads 3rd year Finance subjects and ultimately a Finance major, though you will not be able to achieve all the actuarial exemptions if you pursue that major.

Subject content

The pace and structure of the subject is very similar to *Principles of Finance* and *Accounting Reports and Analysis* (ARA), which you would have already taken in first year.

It has a very clean structure as each week you will cover different topics, with some major topics such as Advanced Capital Budgeting broken down into further sub-topics, so that the content covered each week is consistent and the order of the topics also flows logically. In addition, as you would have covered many of the topics in *Principles of Finance*, ARA, *Introductory Financial Accounting* (IFA) and *Introduction to Actuarial Studies*, it makes learning the subject quite easy.

Lecture Breakdown

1. Payout policy
   - Dividends vs. share buybacks
   - M-M irrelevance Theorem
   - Covered in *Principles of Finance*
2. WACC and capital structure policy
   - How to calculate WACC
   - How capital structure affects WACC
   - Covered in ARA

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

3. Adv. Capital Budgeting: Assessing projects NPV
    - How to do annuities and compare NPV
    - Covered in *Principles of Finance*, *Financial Mathematics I*
    - As an actuarial student, this should be the easiest part.
4. Adv. Capital Budgeting: Sensitivity, Breakeven, Decision Tree Analyses
    - Covered in IFA
5. Raising capital: Equity
    - How companies increase equity
    - Basics covered in ARA
6. Raising Capital: Debt and Leases + non assessable Guest Lecture
    - How companies increase debt
    - Basics covered in ARA
7. Mid-Semester Exam
    - Details below
8. Adv. Capital Budgeting: Real options
    - This was an interesting topic, as they altered the very mathematical call and put options in Principles of Finance and applied the concept of an "option in the future" to a management point of view regarding integrated future options within projects that may change NPV.
    - Based on topics covered in *Principles of Finance*
9. Analysis of Takeover I
    - Around week 9 is when you start learning new things, such as how a takeover can affect capital structure, efficiency and accounting ratios of a company as well as the NPV considerations behind a takeover
10. Analysis of Takeover II
11. Corporate Restructuring + non assessable Guest Lecture
    - Based on the subsidiary topic covered in ARA
12. Risk Management
    - How to reduce risk in projects, to increase project NPVs and firm value

As seen in the lecture breakdown, there are very few foreign topics covered in Corporate Financial Decision Making. The subject elaborates further on topics you have already seen, sometimes by showing a new mathematical technique (e.g. to compare mutually exclusive projects with unequal lives), or applying it to an intuitive managerial approach.

Chander frequently emphasizes the human side of management (like Noel does in ARA for accounting) but this intuitive material comes with quite a bit of memorization of how shares' initial public offerings are executed, how the PE ratio of a merged company is calculated, etc. Therefore, if you didn't enjoy the memorization and dry overload of information that happened in ARA, you may not enjoy that aspect of Corporate Financial Decision Making.

Lectures

Essentially the same as the ARA lectures, lasting for 2 hours in Copland Theatre (at least in this semester), but without the Noel's humour. However, Chander often tries to end his lectures early and when there are the non-assessable guest lectures, you know what option you have ;).

In addition, watching the lectures online is also an equally viable option, with no particular negative sides except for needing the discipline to keep up with lectures.

Mid-Semester Exam

Although the topics covered in the multiple choice mid semester exam were relatively straightforward, there were a few points to note:

They took the "none of the above" answers another step further and had options such as:

d) More than one of the above
e) None of the above

d) a) and c) are true
e) a), b), and c) are true

In addition, there were 20 questions on the exam, and it's worth 20% so 1 question = 1 subject mark :)

If you study enough to be sure of yourself, you will not be daunted by the structure of the mid-semester exam, as the theory tested is straightforward and familiar.

Tutorials

There is a participation mark for tutorials, and although you may groan, it is quite simple to earn those marks. There are pre-tutorial questions that you need to try, and once you have proved that you have tried and handed in the sheet, you have already earned the mark and how you utilize the tutorial time is up to you ;)

The pre-tutorial questions are quite straightforward and force you to keep updated on lectures (or learn to glean the minimum for lectures to barely prove you have tried).

Textbook

Some of the questions will be based from the textbook, which is the only time the textbook was truly required.

The textbook does explain the lecture material clearly, however is not directly aligned with the lectures and has a lot of additional material, which is excellent for additional learning (like the guest lectures).

End-of-Semester Exam

Very reminiscent of the ARA exam, with the pedantic accounting calculations replaced with straightforward calculations from formulas (that you do not need to memorize since there is a formula sheet provided...) and annuity calculations (yay actuarial students' favourite).

The multiple-choice section is in the same, tricky, wordy style of the mid-semester exam.

Final Comments

Though it wasn't the most interesting subject to study, it was well-structured, encouraged participation, and good marks as well. If you enjoyed the straightforwardness of ARA or *Principles of Finance*, you will also enjoy Corporate Financial Decision Making.

FNCE20005 Corporate Financial Decision Making [SM2]

Exemption status	None.
Lecturer(s)	Associate Professor Sean Pinder
Weekly contact hours	1 × 2-hour lecture 1 × 1-hour tutorial
Assessments	Tutorial Participation 10% 1-hour mid-semester test in week 6 20% 3-hour end-of-semester exam 70%
Textbook recommendation	Peirson G., Brown R., Easton S., Howard, P. and S. Pinder. (2015). *Business Finance*. 12th edition, McGraw-Hill. ✗ I do not believe the textbook is necessary.
Lecture capture	Partial audio and video. Recording was turned off for TAPPS exercises (explained below).
Year and semester reviewed	2018 Semester 2

Comments

Subject Content

- Week 1: Introduction and Options
- Weeks 2-3: Raising Capital
- Week 4: WACC and Capital Structure Policy
- Week 5: Payout Policy
- Week 6: Mid-semester Test
- Weeks 7-8: Advanced topics in capital budgeting
- Weeks 9-10: Analysis of Takeovers
- Week 11: Corporate Restructuring
- Week 12: Risk Management

Corporate Financial Decision Making (CFDM) aims to build upon content taught in its prerequisite FNCE10002 *Principles of Finance*. I found the content to be quite interesting as it was generally relevant and applicable to real-life. The subject was sufficiently challenging in that the content was easily approachable, but it required a certain level of analysis and evaluation. CFDM was more theoretical than formulaic; however, I did not find myself mindlessly memorising facts during SWOT-VAC as the content made sense and had sunk in during the semester.

Sean made it very clear that the content to be examined would be from his lectures, so I focussed on learning the content taught in lectures. In the early weeks I also skimmed through the textbook readings, but I found it to be too time-consuming.

Lectures

Two lecture streams were offered this semester – the 8am lecture had quite low attendance while the 9am lecture theatre was typically packed. Lecture slides ranged anywhere from 30-70 slides and were uploaded sufficiently in advance. I found the lecture slides to be messy; the numbering of topics frequently had errors and the organisation of ideas was confusing. The slides were also insufficient for learning as many only had the key ideas or a few words on them; to understand the content, it was necessary to attend or watch a lecture.

Sean described his lectures as large-scale tutorials, and this was reflected in his high level of engagement. Throughout his lectures, he would ask questions and employ students to help with making financial decisions for "Pinder Ltd". He also paused every now and then to check if there were any questions. This engagement and use of examples made his lectures interesting and relevant.

However, most lecturers try to encourage their students to attend lectures in person; Sean essentially forces his students to go by not recording parts of the lecture. In the first lecture, he introduced Think-Aloud-Paired-Problem-Solving (TAPPS) exercises which involve discussion between students about a question. Sean would switch off the recording before showing the question on the projector (as it was not included in the uploaded lecture slides), allow students to discuss it, have some students share their views and then explain the answer with another slide before switching the recording back on. This meant that students who chose to watch lectures online missed out on TAPPS exercises and answers. Although it was possible to obtain the questions and answers from a friend who attended, Sean's explanations were still left unrecorded.

Tutorials

There were 10 tutorials as tutorials began in the second week and did not run in the week of the mid-semester test. The tutorial sheets had two parts: Part A questions and Part B questions. The Part A questions were often textbook questions that only required regurgitation of information. The Part B questions, which were problems that required more thought, represented assessable material. Tutorial marks were given for submitting at least 8 handwritten pieces of work (answers to the Part B questions) and attending the tutorial.

My tutor generally went through the solutions to the Part B questions first as they were not released. If he ran out of time to go through all of the Part A questions, we could still refer to the solutions that would be uploaded to the LMS at the end of the week.

Mid-semester Test

The mid-semester test was a 1-hour closed-book exam with no reading time. A formula sheet was provided and calculators were allowed. The test consisted of 22 multiple-choice questions which covered content from the first 4 weeks. A sample test and solutions were provided, but it did not cover the first topic and had a few questions on content we did not cover. The style of question on the test was similar to the sample, with most questions offering three options and "more than one of the above" and "none of the above", making it hard to guess. Two different tests were written for the two lecture streams.

Although the content itself was taught in lectures and tutorials, many of the questions focussed on how the content was provided in lectures. For example, there were questions concerned with empirical evidence that had appeared on a graph in a lecture and some questions required specific names of possible explanations for phenomena.

Both tests and their solutions were released with results within a week. The average mark for both tests was only about 60%.

Final Exam

The final exam was a 100-mark paper that ran for 3 hours, with 15 minutes reading time. As a BCom subject, there was a hurdle of 50% to pass the subject. An approved calculator was required and the same formula sheet as the one used for the mid-semester test was provided. The final exam had a greater focus on the content covered after the mid-semester test and a marks breakdown by topic was provided. A sample paper and solutions were provided, but again had some irrelevant questions.

The final exam had 3 sections. Part A consisted of 12 multiple-choice questions which were very similar in style to those on the mid-semester test. Section B had 10 true-or-false questions which required justification – no marks were given for correctly choosing true or false. Section C was 3 multipart questions that required more effort. Overall, the exam was a decent length but was about as difficult as expected from Sean.

Necessary Resources

The prescribed text for CFDM was *Business Finance* (12th edition). I completed the readings for the first half of the semester and they supported what Sean taught during lectures. As I began to find myself time-poor, I chose to forsake the readings as they were time-consuming, and the exam was focussed on lecture content anyway. I found that I could understand lectures without extra reading. Hence, I don't think it is necessary to purchase the textbook.

Concluding Remarks

I chose CFDM as my commerce elective thinking it would be interesting and relatively easy to do well in; however, my luck in having Sean as a lecturer meant I was wrong in the latter. That being said, I don't think it was impossible to do well in the subject, just that most people weren't prepared for the way Sean taught it. My advice is to attend lectures and participate in the TAPPS exercises, and make sure you understand the tutorial questions (particularly Part B questions) by attempting tutorial questions and attending tutorials to learn from your tutor and classmates.

IBUS20007 International Business Experience [SUM]

Exemption status	None.
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.

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.

JAPN10001 Japanese 1

Exemption status	None.
Lecturer(s)	Ms Masako Nagayama
Weekly contact hours	2 × 2-hour seminars
Assessments	5 Fortnightly Quizzes 5 × 3% Oral Assessment in Week 6 and Week 11/12 20% Cultural Discovery Project, due in Week 12 15% 2-hour end-of-semester examination 50%
Textbook recommendation	Banno, E. (2011). *Genki 1 Workbook: An Integrated Course in Elementary Japanese*. Tokyo, JP: Japan Times. ✓ The textbook was necessary to follow along with content in seminars, and to also study in preparation for all assessments.
Lecture capture	None
Year and semester reviewed	2018 Semester 1

Comments

This subject is intended for students undertaking Japanese for their first time. Although the pace of this subject is fast, it is reasonable to keep up, as long as persistent effort is put in throughout the semester. This subject is a great breadth as it gives a good foundational insight for students interested in learning Japanese and learning aspects of Japan culture.

Subject content

- Week 1-2: Lesson 1 - Self-introduction, Time & numbers, Hiragana
- Week 3-4: Lesson 2 - Shopping, Dining, Katakana
- Week 5-6: Lesson 3 - Daily Routines, Invitations, Kanji
- Week 7-8: Lesson 4 - Locations, Talking about past events and habits
- Week 9-10: Lesson 5 -Travel, Interests, Likes & Dislikes
- Week 11-12: Lesson 6 - Requests, Permissions, Rules, Directions

Seminars

Seminars consisted of two 2-hour classes each week. A chapter of the Genki textbook was covered every 2 weeks, meaning chapters 1-6 of the textbook were covered for this subject in the semester. At the end of every 2 weeks, a quiz worth 3% was held in class covering the chapter learnt. The teachers covered weekly seminar slides in conjunction with the relevant chapter in the textbook. I found that the speed was well-paced, and although it seemed fast at times, it was sufficient if you had reasonably prepared and studied after the class each week. There was around 20-30 students in a

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

seminar which made learning with the teacher more personable and interactive. There were also many pair work activities involved to practice communicating and get a better grasp of language nuances and appreciate the intricacies and cultural aspects of the language. Because the classes were of smaller size, this made classes more enjoyable by getting to know your teacher and other students better, allowing better personalised feedback on your performance in quizzes and progress in verbal communication.

Assessments

The fortnightly 3% quizzes were emphasized not to be a big deal if you did not do well since they were worth very little by the teachers. However adding up to 15% altogether made it worth a significant amount over time. They each consisted of a listening component, where sentences read out had to be recited into Japanese, and writing/grammar components, where sentence structures, grammar and character recollection were tested. Again, these tests were not very difficult as long as you adequately revised the chapter for that week.

There were also 2 oral assessments worth 10% each which comprised of a script having to be written and memorised by you and a partner. These were performed in front of your class with your teacher marking your ability to hold a fluent conversation with your partner. At the end of the second oral assessment, a cultural discovery project had to be completed where you and your partner analysed the content of your script in reference to Japanese culture and in comparison against other foreign cultures. Both of these assessments were not that difficult to complete as the Japanese department gave well-written guidelines on how to complete the tasks.

End-of-Semester Examination

The exam was a 2-hour reading and writing exam which was worth 50% of your total grade. Prior to the exam, a document was given detailing the type of format that may be encountered for each question in the exam, which was very useful in thinking about how to approach your revision. However, I expected the exam to be very similar to the weekly quizzes done in class, and therefore found that the exam was much more difficult than my initial expectations. Although the exam was still doable, it involved a heavy amount of reading short passages and answering questions to them, which was not covered nor practiced much in class. The textbook briefly covers this in the Kanji practice sections which is well-worth revising over. Apart from this, the time limit was very reasonable to give each question an adequate amount of time to answer.

Concluding Remarks

Overall, Japanese 1 gives you a wonderful introduction to the foundations of the language, and to learn about the cultural and social aspects of every day Japanese conversation . I found it to be an enjoyable breadth as the lessons/assessment requirements were very well-structured and detailed.

MAST90082 Mathematical Statistics

Exemption status	None.
Lecturer(s)	Liuhua Peng
Weekly contact hours	3 × 1-hour lectures
Assessments	2 individual assignments 2 × 10% 3-hour end-of-semester exam 80%
Textbook recommendation	Casella, G., & Berger, R. L. (1990). *Statistical Inference* (2nd ed.). Belmont, CA: Duxbury Press. Hogg, R.V., McKean, J., & Craig, A.T. (2013). *Introduction to Mathematical Statistics* (7th ed.). Upper Saddle River, US: Pearson Education. Lecture notes are sufficient for this subject, but the lecturer regularly refers to the Casella and Berger textbook. You may want access to the textbook to explore concepts deeper.
Lecture capture	None
Year and semester reviewed	2018 Semester 1

Comments

Mathematical Statistics is one of the more common electives for students who are doing the Master of Commerce degree majoring in Actuarial Science. Also it is a pre-requisite for some other electives listed in the study plan. It extends on topics covered in MAST20005 *Statistics*, but it goes deeper, and some topics are not easy to understand.

Subject content

Statistics is about using data available and fitting it to a probabilistic model. Doing this course, students should gain a deeper understanding of the principles of mathematical statistics and some of its important applications. Its content is divided into three chapters:

- **Chapter one – point estimation**

  This chapter introduces the idea of point estimation, including Method of Moment Estimators (MME), Maximum Likelihood Estimation (MLE), Uniform Minimum Variance Unbiased Estimators (UMVUE), Bayes Estimator, etc. Some of them you will have been exposed to before, however, this subject will go more in depth – introducing and applying properties of those point estimations.

- **Chapter two – hypothesis testing**

  Hypothesis testing has been used a lot in MAST20005 *Statistics*. In this chapter, we will understand the fundamental idea of hypothesis testing. The main tests we apply here are the Most Powerful Test (MPT), Uniformly Most Powerful (UMP) test, Likelihood Ratio Test (LRT), and Bayes tests. In addition, various theorems and lemmas are introduced to find the required tests.

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- **Chapter three – interval estimation**

  This is the last topic, which is based on chapter two – hypothesis testing. After a brief introduction to interval estimation, we will learn four main approaches – namely inverting a test, pivoting the CDF, pivotal quantities and Bayes intervals. The course ends up with evaluating interval estimators.

Based on the course structure, it may seem that there is not much content in this course. However, the workload is indeed quite heavy. You will be required to do lots of proofs, so a good understanding of theorems and lemmas is very essential.

Lectures

This is the first year that Liuhua Peng taught this subject. As a result, the whole course was delivered in quite a different way from previous years – for example, a relatively large change in its structure. Moreover, there was no recording for this subject before, while now you have full access to both audio and video recordings.

Liuhua wrote all of his notes on his tablet and students are expected to print out the lecture notes beforehand and follow him in the lecture. Although the lecture is recorded and annotated lecture notes will be uploaded onto the LMS after each lecture, attendance is recommended as it is a great opportunity to interact with lecturer.

There is no tutorial or workshop for this subject. Also, no exercises will be given throughout the semester, except the pre-requisite questions at the start of the semester and revision questions at the end of the semester. However, the lecture notes do contain some examples and exercises and if you want more questions to practice, the textbook is a good resource.

Liuhua has a three-hour consultation every week so you have enough time to discuss with him if you have any problems with the lecture material.

Assignments

There are two assignments due roughly in week 7 and week 12 of the semester, each worth 10% of the overall mark. The first assignment covers content from chapter one mainly and the second assignment covers the rest.

These assignments were incredibly long, with 15-20 questions, including some optional questions. Some questions are pretty challenging and time-consuming. Unlike most other maths subjects, all questions in each assignment will be marked including optional ones. Marks for optional questions will be added on as a bonus mark but the total mark is restricted to 10. Overall, students did pretty well in assignments – quite a lot of students achieved full marks for both assignments.

Given that no additional tutorial questions were provided, the assignment is really good practice – in fact it was the only source of exercises. It sometimes gave tips for final exam.

End of Semester Exam

The exam is a standard three-hour exam that you would expect from the mathematics department. Students are allowed to take in two double-sided handwritten or printed A4 cheat sheets. However, calculators are not permitted. Putting in every single definition, theorem and proof in as small of a font as possible is not recommended. The cheat sheet should just cover main theorems, results and lemmas to make it easier for you to find what you need in the exam.

Because this was the first time Liuhua taught this subject, and the course structure has been changed quite a bit, past exams may not be a good indicator for the exam. You may see some past exam questions testing on material that are

not covered in this subject. Therefore, assignments are the best resource for your revision. Liuhua provided a revision question set by the end of the semester to assist your revision – some questions are very challenging though.

Liuhua runs regular consultations every week during the whole revision period, so you should have enough opportunities to ask as many questions as you like.

Overall, the level of difficulty for the final exam was reasonable. You only have three to four questions to do in three hours (I had three questions in my exam) and they are all standard questions. Personally speaking, the final exam is relatively easier than the assignment questions. Students generally did well.

Tips for Success

Lecture material is generally delivered clearly through demonstration of examples and proofs. While watching at the lecturer do the questions and understanding the methods may seem quite easy, it is strongly recommended that you go through proofs by yourself. Once you start to work on questions by yourself, you may find it harder than expected. If you simply look at the course structure – only three chapters, you may think the contents are not much. But in fact, the workload is quite heavy – too many theorems and proofs. A reasonable amount of time should be spent on this subject and this will make the content eventually manageable.

The cheat sheet does take a long time to prepare, however, it is worth the time you spend as a good summary will help you a lot in the final exam. Silly mistakes do occur, so do not rush in the exam – the time given should be enough.

MUSI20150 Music and Health [SM2]

Exemption status	None.
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 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.

STDY00002 Study Abroad 12.5 [WIN]

Host university	London School of Economics and Political Science (LSE)
Subject	FM202 Analysis and Management of Financial Risk
Exemption status	None.
Lecturer(s)	Depends on host university
Weekly contact hours	Depends on what class and university you choose. In my case, it was a 3-hour lecture and 1.5 hour tutorial or lab every Monday to Friday for 3 weeks.
Assessments	Mid-semester exam on Wednesday week 2 50% Final exam on Friday in week 3 50%
Textbook recommendation	None. LSE will provide printed lecture slides for every student
Lecture capture	None.
Year and semester reviewed	2018 Winter Term

Comments

STDY00002 Study Abroad is quite different to normal Melbourne uni subjects. It allows you to travel to another country and complete a subject at a different university of your choice. 12.5 credits will be transferred and your overall score is not counted in your WAM i.e. a pass or a fail, but you will receive your formal transcript from your host university.

There are lots of options for this subject (you can even choose to go to Harvard!). You can either choose a subject that is equivalent to your breadth or elective. Full information can be found here.

I chose to study FM202 Analysis and Management of Financial Risk at LSE mainly because it is very relevant to actuarial studies. It actually helped me a lot with my understanding in *Financial Mathematics II* since some of the contents are in common. This review will not only scrutinise this subject, but also the university, but you may get a different experience.

Subject content

Topic 1: Foundations

Topic 2: Hedging in equity and fixed income markets

Topic 3: Endogenous risk and limits to arbitrage

Topic 4: Value at risk

Topic 5: Credit risk

Topic 6: Credit derivatives and asset-backed securities

Topic 7: Regulation and the credit crisis

Lectures, tutorials and labs

Every lecture is 3-hours long at LSE and will not be recorded during summer school, so you need to pay close attention during lectures. The lecture slides provided will not be enough for your understanding, but the lecturers explain the slides very well and give you a lot of insight into their research and work. A drawback of the lectures is that the lecturers just teach at their own pace, so you might go to tutorials or labs and find that you haven't learnt it yet.

Tutorials are very well taught by PhD students and again, they will give you personal insights on their research and how the theories link to the corporate world.

In the labs, you will go through some spreadsheets but these are taught in a very fast pace. It will not be examined, so don't worry.

Assessments

The mid-semester exam covers the first half of the subject and the final exam covers the second half only. The exams are designed for you to pass. If you did not study at all, you can cram overnight and get a pass, but I don't recommend you risking it.

Application process

The application process was long and time consuming. You first need to get approval from Stop 1 and it might take 2–4 weeks for them to process. Then you apply to your host university and wait for your confirmation letter which takes about 1 week. And the final step is to apply for a visa which normally takes less than 3 weeks. I had some issue with Australian Post when applying the visa and it took me 7 weeks to get my passport back. The visa officer will ask you to choose between sending the visa directly to your home address which is faster or pick up at their office. I highly recommend you choose the second option if you are risk averse.

Again, more information can be found on short term study abroad website and your host university website.

Fees and scholarships

The subject itself cost 2,000 pounds and accommodation was not much cheaper than the subject. You can apply for scholarships and the Melbourne Global Scholars Award is awarded automatically based on your WAM. I believe the Global Scholars Award is given to most of the students exchanging short term and $1,000 is awarded.

Travelling

This is the best part of this subject. You won't have a lot of pressure on having a good mark on your exam since it won't be included in your WAM. You can spend a lot of time exploring the city and make some life long friendships. Have fun!

Subject Review Index

This section serves as an index for each subject review across all the different editions of the *Actuarial Students' Society Subject Review*.

Table 2: Core Subjects

Subject Code	2015 Start	2016 Start	Mid	End	2017 Mid	End	2018 Mid	End
ACCT10001		1	1	1	1	1	1	1
ACCT10002	2	2	2	2	2	2	2	2
ACTL10001	2	2	2	2	2	2	2	2
ECON10003		2	2	2	2	2	2	2
ECON10004	1	1	1	1	1	1	1	1
FNCE10002					1	1	1	1
MAST10006		1	1			1	2	2
MAST10007			S	S		2	2	2
MAST10008	1	1	1	1	1	1	1	1
MAST10009	2	2	2	2	2	2	2	2
ACTL20001	1	1	1	1	1	1	1	1
ACTL20002	2	2	2	2	2	2	2	2
ECON20001	2	2	2	2	2	2	2	2
MAST20004	1	1	1	1	1	1	1	1
MAST20005	2	2	2	2	2	2	2	2
MGMT20001		2	2S	2S	1	1	1	2
ACTL30001	1	1	1	1	1	1	1	1
ACTL30002	1	1	1	1	1	1	1	1
ACTL30003	2	2	2	2	2	2	2	2
ACTL30004	2	2	2	2	2	2	2	2
ACTL30005	2	2	2	2	2	2	2	2
ACTL30006	1	1	1	1	1	1	1	1
ACTL40002		1	1	1	1	1	1	1
ACTL40003				2	2	2	2	2
ACTL40004		1	1	1	1	1	1	1
ACTL40005				A	A	A	A	A
ACTL40006		1	1	1	1	1	1	1
ACTL40007						2	2	2
ACTL40008		2	2	2	2	2	2	2
ACTL40009				2	1	12	1	2
ACTL90001						1	1	1
ACTL90002						2	2	2
ACTL90005								2
ACTL90006							1	1
ACTL90007								2
ACTL90008								2
ACTL90018							1	1

Table 3: Breadths and Electives

Subject Code	2016 Start	Mid	End	2017 Mid	End	2018 Mid	End
AGRI20030			J				
BLAW10001	1	1					2
BLAW20001	1	1					
CHIN20026				2	2		
COMP10001		1	1			1	1
COMP20005	2	2		1	1	1	1
COMP90038							2
ECOM30004							2
ECON20002	1	1	S	S		1	2
ECON20005			2	2			2
FNCE10001		1					
FNCE20001	2	2	2	1			
FNCE20002							2
FNCE20005						1	1
FNCE30007	2	2		1	1		
GERM10008	1	1					
IBUS20007							2
JAPN10001		1	1			1	1
MAST20022			2	2	2		
MAST30020		1	1				
MAST90082				1	1	1	1
MGMT30006			2				
MGMT30017			W	W	J	J	
MUSI20150							2
MUSI20168			1	1			
SCIE20001					2	2	
STDY00002							2
D-MATHSC		O					

Table 4: Legend

1	Semester 1
2	Semester 2
S	Summer Term
W	Winter Term
J	July Intensive
A	All Year
O	Other

List of Exemptions

Table 5: Actuaries Institute exemption subjects and corresponding university subjects

Exemption subject	University subject
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[1]
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
Current as of 19th January 2017.

[0]Students are also eligible for the exemption if they complete FNCE20001 Business Finance

Transition to Foundation Program

Table 6: Transition to Foundation Program

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

Source: Centre for Actuarial Studies
Current as of 12th February 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. 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 7. Others will just contribute to the same exemption subject as their undergraduate counterparts (and hence have common content), as in Table 8.

Table 7: 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
ACTL90009 Actuarial Practice and Control III	ACTL40009 Actuarial Practice and Control III
ACTL90010 Actuarial Practice And Control I	ACTL40006 Actuarial Practice and Control I
ACTL90011 Actuarial Practice and Control II	ACTL40007 Actuarial Practice and Control II
ACTL90012 Actuarial Science Research Report	ACTL40001 Actuarial Studies Research Essay
ACTL90013 Actuarial Studies Projects	ACTL40005 Actuarial Studies Projects
ACTL90014 Insurance Risk Models II	ACTL40003 Risk Theory II
ACTL90015 Mathematics of Finance IV	ACTL40008 Advanced Financial Mathematics II

Table 8: Graduate and undergraduate actuarial subjects with common exemption subjects

	Graduate subject	Undergraduate subject
CT1	ACTL90001 Mathematics of Finance I	ACTL20001 Financial Mathematics I ACTL20002 Financial Mathematics II
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
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