A Guide to Studying Actuarial Science

Version 3.4 — Semester 2 2022

Prepared by the *Student Actuarial Society* at *Curtin University*

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Foreword

The Student Actuarial Society would like to present our guide to studying Actuarial Science at Curtin University.

The primary purpose of this document is to provide information regarding units commonly taken by Actuarial students at Curtin. If you are not a *current* or *future* actuarial student at Curtin University, the majority of the information in this document may not be relevant to you. This document is *by* students, *for* students and it is through this approach, we hope to provide a valuable insight that is difficult to obtain elsewhere.

The heart and soul of this document is the unit guides which provide information on units taken by actuarial science students at Curtin. They will answer your burning questions including "how difficult is the unit?", "should I buy the textbook?", "what is the teaching style?" and more. You may wish to navigate *directly* to units that interest you via the table of contents above or the bookmarks of this document if your pdf viewer supports it. This document contains a large number of links to internal content (including particular unit guides when they are mentioned). A handy keyboard shortcut on some pdf readers is ALT+LEFT ARROW which allows you to return to the previous location in the document after clicking a link to an internal location in the document. The unit guides are ordered such that the core units for each of first year, second year, third year and honours appear first, followed by optional units (1000 units, 2000 units, 3000 units and 4000 units).

We seek to continually expand and improve this document and may add more sections to this guide in future. We have also recently added a section on careers after the unit guides along with performing a major overhaul of the formatting of the document.

A significant amount of effort and research has gone into the creation of this guide so we hope you find it helpful. We are always looking to improve the guide so if you would like to contribute to the guide in any way, please contact us as directed on the webpage linked at the bottom of each page of this document. Ways in which your input may be helpful include:

- » Assistance with unit guides (see the appendix for a list of units that require this):
  - ↳ Updating information in unit guides that are incomplete.
  - ↳ Providing information on a unit that is yet to be reviewed (a list of such units can be found in the appendix).
- » Suggestions for additional information that might be added.
- » Correction of spelling and grammatical errors.
- » General feedback on how the guide can be improved.

The SAS guide is a constant work in progress owing to the nature of ever-changing information. Expect us to release an updated version each year, if not each semester.

Thank you for taking the time to read our guide, we hope you find it helpful.

Essential Resources

The exemptions: Accreditation from the Actuaries Institute

As an actuarial student, you would have no doubt heard of the foundational subjects (formerly CT subjects). However, you may or may not be familiar with all the finer details surrounding them. Here we have collated some information about actuarial accreditation that is pertinent to those actuaries in the making who are studying at Curtin University specifically.

Parts

In the current system there are three educational parts (I, II and III) to becoming an actuary (for more information, visit the Actuaries institute website).

A Bachelor of Science in Actuarial Science at Curtin allows students to satisfy all Part I requirements from the Actuaries Institute. Part I comprises of six subjects, each of which has corresponding Curtin units (see table below). By obtaining sufficient grades (an average of 73% across all units in a subject and a minimum of 65% per unit) in the corresponding Curtin unit(s), one may gain exemption from sitting the corresponding foundational exams which are hosted by the Actuaries Institute. Please note that subject CB2 comprises of one unit only, resulting in a minimum requirement of 73% for the exemption.

Here follows a breakdown of the weighting of each exempt unit. The ordering of these units can be found in the Undergraduate study plan.

Subject	Unit	Weighting
CS1 (Actuarial Statistics)	STAT1005 Introduction to Probability and Data analysis	40%
	STAT1006 Regression and Nonparametric Inference	20%
	STAT2001 Mathematical Statistics	20%
	STAT3001 Statistical Modelling	20%
CS2 (Risk modelling and survival analysis)	STAT3001 Statistical Modelling	25%
	STAT3005 Stochastic Processes	25%
	MATH3008 Survival Models & Analysis	25%
	STAT3009 Risk Analysis	25%
CM1 (Actuarial Mathematics)	MATH2004 Theory of Interest	33%
	MATH3009 Contingencies 1	33%
	MATH3010 Contingencies 2	33%
CM2 (Financial Engineering and Loss Reserving)	STAT3006 Financial Engingeering 1	33%
	STAT3010 Financial Engineering 2	33%
	STAT3008 Provisioning Techniques	33%
CB1 (Business Finance)	FNCE2003 Business Analysis for Investment	50%
	FNCE3000 Corporate Finance	50%
CB2 (Business Economics)	ECON1001 Actuarial Economics	100%

Honours

Completing Honours in Actuarial Science at Curtin affords students the opportunity to complete 2 of the 4 Part II subjects. Honours is available to high performing students in the Actuarial Science third year stream after completion of the initial three-year bachelor's degree. The remaining 2 subjects of Part II and all of Part III must be completed externally via the Actuaries Institute. Most students who choose this path, do so alongside full-time work.

The notes

Each of the above subjects has corresponding study materials, prepared by ActEd. Official notes are available for purchase via the ActEd website. The notes, as they are often referred to, are an integral part of studying Actuarial Science. These act as the textbooks used throughout the degree. It is very useful and, in some cases, essential (see unit guides below for further advice on specific units) to purchase the ActEd notes for these units. They become so important in fact that many jokingly refer to them as "their Bible". Admittedly, the notes can be quite expensive, especially considering there are 6 sets in total, though they really are great resources. That said, illegal copies often circulate among students, though the Student Actuarial Society does not condone this.

As most first year units are shared across different disciplines, they tend not to follow the notes as strictly and as such not many students will have used them up to this point. However, from second year onwards, students will start to take on Actuary units, as they are referred to. These units religiously follow the notes and will almost never deviate from them. It is thus very useful to obtain the notes around this time as they provide valuable insights and additional practice.

Actuarial Science Formulae and Tables

Students might have heard about the "orange book". This is primarily used by UK students, and is a compilation of most formulas to be used throughout actuarial education. Curtin actuaries do not use the orange book, but we have a similar resource uploaded to students' Blackboards from Second Year Second Semester onwards. It is not used terribly often, but students refer to it as a "go-to" to find a particular formula from previous semesters that they haven't noted elsewhere.

Course structure

Undergraduate study plan

The Bachelor of Science in Actuarial Science at Curtin university is a three-year degree. In the third year of the degree students may choose between two streams (see the section below for more information on making this decision):

» Actuarial Science stream
    ↳ study all full actuarial Foundation program exemption units.
» Actuarial and applied statistics stream
    ↳ only allows for partial completion of exemption units but is a broader, more flexible degree.

High performing students who completed the Actuarial Science third year stream are eligible to apply to an additional Honours year after completion for their first three years of study. This will give them a Bachelor of Science in Actuarial Science *with Honours* and allows for satisfaction of exemption requirements from Actuary program (previously part II) university-delivered subjects.

Nominal admission criteria is a course weighted average (CWA) of above 75% and satisfaction of exemption requirements for at least 4 of the 6 foundation subjects in the new system. This is of course subject to change and may be negotiated with the actuarial science course coordinator.

First and second year

Year 1		Year 2	
Semester 1	**Semester 2**	**Semester 1**	**Semester 2**
NPSC1003 Integrating Indigenous Science	FNCE2003 Financial Statement Anlaysis	FNCE3000 Corporate Finance	STAT3005 Stochastic Processes
MATH1015 Linear Algebra 1 or MATH1017 Advanced Mathematics 1	MATH1016 Calculus 1 or MATH1018 Advanced Mathematics 2	MATH2004 Theory of Interest	STAT3001 Statistical Modelling
ACTL1002 Intro to Actuarial Science	ACTL1003 Introductory Actuarial Practices	STAT2001 Mathematical Statistics	STAT3006 Financial Engineering 1
STAT1005 Intro to Probability & Data	STAT1006 Regression & Nonparametric Inference	Optional (choose 1) COMP1005 Fundamentals of Programming MATH2009 Calculus 2 MATH2015 Mathematical Computing INDE2000 Supply Chain Modelling & Optimisation MATH2011 Operations Research INVE3001 Portfolio Management	ECON1001 Actuarial Economics

Choosing alternative, optional and elective units

While the actuarial science degree is inflexible due to the large amount of content it must cover to be accredited by the Actuaries Institute, there are still a handful of times students can make a choice about what units they take.

Please refer to the unit guides below for more detailed descriptions of each unit we mention here.

Alternative units

This is where you get to choose between two units (it will say "OR" between two units in the handbook). In the case of actuarial science, first year maths units and economic units are examples of alternative units.

If you really enjoyed Mathematics Specialist in High School, you should choose MATH1017 in your first year. You will be extended in this unit and have a slight advantage in future units compared to those who chose MATH1015.

Optional and Elective units

This is where you choose a unit (or units) from a list of options, usually totally between 4 and 6 units. In the actuarial science degree, you get optional units in both second and third year. Consult the Curtin Handbooks of eStudent for this list. Some students depart from the list through negotiation with the course coordinator. Python is a useful skill in data science but it is not taught be default in the actuarial degree at Curtin. If you want to learn the Python language, COMP1005 (Fundamentals of Programming) is an excellent optional unit to choose.

Electives can be used to take any unit at Curtin, provided you satisfy the conditions of enrolment.

It is often a good idea to decide of what you want to learn more about and then use the units taken by other degrees in that area to help you decide.

- » If you want to learn more programming and data science look at the data science handbook.
  - ↳ Data science: http://handbook.curtin.edu.au/courses/32/320724.html
- » If you want to learn more economics, finance and business, look at some of the commerce majors.
  - ↳ First year commerce: http://handbook.curtin.edu.au/courses/32/322286.html
  - ↳ General commerce majors: http://handbook.curtin.edu.au/courses/32/322389.html
  - ↳ Accounting and finance majors: http://handbook.curtin.edu.au/courses/32/322388.html
- » If you want to learn more maths, look at the handbook for the two mathematical majors.
  - ↳ Financial mathematics: http://handbook.curtin.edu.au/courses/32/320729.html
  - ↳ Industrial and applied mathematics: http://handbook.curtin.edu.au/courses/32/320715.html

Things to watch out for:

- » To be eligible for graduation, Curtin students cannot exceed 250 credits of first year units (units with unit code numbers in the 1000s).
- » You must satisfy the prerequisites.

A Comparison of Third Year Streams

Third year streams 2022 onward[3]

Year 3 (Actuarial & Applied Stats)		Year 3 (Actuarial Science)[4]	
Semester 1	Semester 2	Semester 1	Semester 2
MATH3008 Survival Models & Analysis	MATH3004 Industrial Project	MATH3008 Survival Models & Analysis	STAT3009 Risk Analysis
STAT2003 Analytics for Experimental & Simulated Data	STAT2004 Analytics for Observational Data	MATH3009 Contingencies 1	MATH3010 Contingencies 2
STAT3000 Statistical Inference	Option (choose 1) INDE2001 Logistics Models & Optimisation INVE3000 Intro to Derivative Securities INVE3001 Portfolio Management MATH2000 Network Optimisation	STAT3010 Financial Engineering 2	STAT3008 Provisioning techniques
		Elective (choose 1)	STAT2004 Analytics for Observational Data
Elective (choose 1)	Elective (choose 1)		

OR

In the third year of the Actuarial Science degree, students may choose between two streams:

» Actuarial Science Major
» Actuarial and Applied Statistics Major

As students draw closer to making this decision, they will usually be provided with some guidance on the matter from the faculty. Here we will provide our own comparison of each stream to further assist students in their decision-making process.

First, it should be stated that each stream has its own benefits and each will fit particular individuals differently. The Actuarial Science stream is designed to complete the first stage of the actuarial accreditation process, whereas the Actuarial and Applied Statistics stream abandons this endeavour in favour of a broader, more flexible final year. As Curtin does not actually offer a statistics degree directly, this second option is a close as you can get to obtaining a statistics degree from Curtin.

If you are a high performing student with the intention to become an Actuary, the Actuarial Science stream is the best choice for you.

Conversely, if you have secured a graduate position in an area that is not actuarial via vacation work for example, you might be better suited to the Actuarial and Applied Statistics major as it will allow you to develop skills for your upcoming employment. This would be as opposed to choosing the Actuarial Science major and learning about actuarial concepts which will not be applicable to you.

Many students find the Actuarial Science stream quite challenging due to increase in workload. The course handbook prescribes taking some of the most challenging exemption units simultaneously in first semester, followed by more that build on this knowledge in semester 2. If you failed to meet the exemption requirements for multiple exemption units prior to commencing third year (particularly Theory of Interest

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[3] These third-year stream study plans will not actually come into effect until the year 2022 (when those that commenced their degrees in 2020 reach their third year).

[4] Note that the handbook for the Actuarial Science third-year stream is absent from the actuarial science handbook at the time of writing, so this is only an anticipated ordering. The handbooks for units were found by searching "STAT3" and "MATH3" in the Curtin unit handbook search from. The syllabi of these newfound units were then compared with the actuarial curriculum to determine where they fit in with regard to exemptions.

and Stochastic Processes in second year), you are probably better off doing the Actuarial and Applied Statistics stream. This is because the main objective of the Actuarial Science stream is to cover all 6 exemptions.

If you would like to be an actuary but are also concerned about the difficulty of the Actuarial Science stream, you could consider studying part-time. This will lengthen your degree but also allow you give you a higher chance of success in gaining exemptions.

Postgraduate: Honours and Masters study plans

Honours (fourth year)

Year 1/ Year 4	
Semester 1	**Semester 2**
ACTL4000 Actuarial Control Cycle 1	ACTL4001 Actuarial Control Cycle 2
ACTL4003 Predictive Analytics Principles	ACTL4002 Actuarial Asset Liability Management
STAT4004 Actuarial Science Honours Dissertation 1[5]	ACTL4004 Actuarial Risk Management
	STAT4001 Actuarial Science Honours Dissertation 1

Completing Honours in Actuarial Science at Curtin affords students the opportunity to complete 2 of the 4 Part II subjects. Honours is available to high performing students in the Actuarial Science third year stream after completion of the initial three-year bachelor's degree. The remaining 2 subjects of Part II and all of Part III must be completed externally via the Actuaries Institute. Most students who choose this path, do so alongside full-time work.

Masters

The masters program allows students who have completed a quantitative (but not actuarial) bachelor's degree in the past and wish to pursue the actuarial pathway. It is equivalent to the three-year undergraduate actuarial science degree at Curtin in the sense that it is designed to provide exemption from the actuarial Foundation subjects (previously part I). Note however that its 1.5-year duration means it is insufficient to cover every subject (you will always miss out on one) and it does not cover the Actuary subjects.

Note that:

- » Units in **bold** below are core units and the remaining units are optional (select 3).
- » A maximum of 2 core units can be replaced with optional units.
- » Keep note of the footnotes that reference where you can select between two alternatives. Such units will be in ***bold italics***.
- » Other optional units can be taken upon consultation with course coordinator.

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[5] Note that this unit is worth 50 credits points (double those of a normal unit).

Availability		
Semester 1	**Semester 2**	**Both**
STAT5003 Financial Engineering 1	*STAT5004 Financial Engineering 2[6]*	**MATH5001 Mathematics Masters Project 1**
MATH5009 Life Contingencies 1	*INVE5001 Advanced Derivative Securities[7]*	*FNCE5000 Advanced Corporate Finance and Theory[8]*
MATH5011 Survival Analysis	*STAT5007 Stochastic Processes[9]*	FNCE5011 Contemporary Issues in International Finance
NPSC5000 Science Masters Research Methodologies	**STAT5000 Risk Analysis and Credibility Theory**	ACCT5013 Intermediate Financial Accounting
MATH5006 Numerical Methods	MATH5000 Theory of Interest	FNCE5008 Financial Principles and Analysis
STAT5008 Mathematical Statistics	ECON5000 Actuarial Economics	
ISAD5000 Advanced Optimisation Techniques	FNCE5003 Advanced Business Financial Modelling	
STAT5002 Statistical Modelling	MATH2005 Practical Mathematical Financial Modelling	
	MATH5010 Life Contingencies 2	

Source: http://handbook.curtin.edu.au/courses/31/319304.html

Master to undergraduate unit correspondence table

All the exemption subjects in the Masters degree have corresponding undergraduate units that are effectively the same unit. In many cases the only difference between masters and undergraduate units is a slightly different set of questions in the exam.

If you are a masters student, use this table to find the corresponding undergraduate units for your masters units. Where you see the name of one of these undergraduate units anywhere in this document (the unit guides and Actuaries institute subject mapping in particular), you can take it as interchangeable for the corresponding masters units in most cases.

Masters Unit	Undergraduate Unit	Exemption
ECON5000 Actuarial Economics	ECON1001 Actuarial Economics	CB2
MATH5000 Theory of Interest	MATH2004 Theory of Interest	CM1
MATH5009 Life Contingencies 1	MATH3006 Life Contingencies 1	CM1
MATH5010 Life Contingencies 2	MATH3007 Life Contingencies 2	CM1
STAT5003 Financial Engineering 1	STAT3006 Financial Engineering 1	CM2
STAT5004 Financial Engineering 2	STAT3007 Financial Engineering 2	CM2
STAT5008 Mathematical Statistics	STAT2001 Mathematical Statistics	CS1
STAT5007 Stochastic Processes	STAT3005 Stochastic Processes	CS2
STAT5002 Statistical Modelling	STAT3001 Statistical Modelling	CS2

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[6] Can alternatively choose FNCE5000 Advanced Corporate Finance and Theory

[7] Can alternatively choose STAT5007 Stochastic Processes

[8] Can alternatively choose STAT5004 Financial Engineering 2

[9] Can alternatively choose INVE5001 Advanced Derivative Securities

STAT5000 Risk Analysis and Credibility Theory	STAT3002 Risk Analysis and Credibility Theory	CS2

Check the table above for further information on exemptions.

Unit Guides

Disclaimers

- » By default, this guide assumes that units taken each year are according to the Curtin Actuarial Science Handbooks. We acknowledge that variations may exist for students pursuing alternative study plans. Information relating to the timing of events (e.g. the semester in which a unit is taken) should fit the majority of people with some exceptions.
    - ↳ The unit guides are designed to provide information that might be of use to students. That being said, it is subjective in nature and should be interpreted as such. While we try to remain objective, the biased opinion of the author coming through in some fashion is an inevitability. To this end in part, we have refrained from identifying or making any direct personal comments about lecturers, as this document is not designed to rate the performance of lecturers. We have chosen to do this to avoid any material in this document being interpreted as potentially unfair or defamatory.
- » It is the responsibility of the reader of this guide to check the validity of information provided. Many of the useful links above can help with this.
    - ↳ For example, to check the credibility and relevance of information we encourage readers of this guide to check if the lecturer has changed. One way of doing this would be to check the unit outline. We will endeavour to indicate this if the information is known to us, but you may know before we know or be looking at an older version of this document in which, such information was not known.
- » Where appropriate, we have used past tense to indicate that these are past experiences of the units that will not necessarily follow through to future offerings. Quote ASIC: "Past [experience] is not a reliable indicator of future [experience]".

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First Year

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Unit Guides
Exemptions this semester

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Semester 1

Exemptions this semester

Unit	Subject	Weighting
STAT1005 Introduction to Probability and Data analysis	CS1 (Actuarial Statistics)	40%

What to expect

As this is most students first ever semester, the biggest challenge that students will face is adjusting to the university environment. There is a lot more content to cover and a lot less "hand holding" as opposed to high school. Rest assured however that everyone adjusts rather quickly.

Students will be introduced to the exemptions and will hear about the notes as key parts of studying Actuarial Science. Please see The exemptions: Accreditation from the Actuaries Institute and The notes for a refresher.

During first semester, students only have one exemption unit to worry about. This unit is shared with other disciplines and does not follow the notes religiously, so most students get away without using them at this point. That said, we recommend students acquire the notes as early as possible as they really are fantastic resources. Illegal copies often circulate among students, though the Student Actuarial Society does not condone this.

Importantly, students get to choose which Math unit they wish to take. MATH1015 Linear Algebra 1 or MATH1017 Advanced Mathematics 1. Most pick Linear Algebra as is the easiest. A realistic perspective of someone who did not take Advanced Math: this unit does not provide you with content not covered later. However, the rigour and difficulty might ease the transition from first year to second year as it is more in line with what is to come.

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Unit Guides
ACTL1002 Introduction to Actuarial Science

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ACTL1002 Introduction to Actuarial Science

Challenge rating	Exemption
0.5	None

Type of unit	Availability
Compulsory	Semester 1 only

Prerequisites for this unit…	This unit is a prerequisite for…
None	None

Syllabus

- » Operation of Insurance, Banking and Superannuation
  - ↳ General Insurance
  - ↳ Health Insurance
  - ↳ Life Insurance
  - ↳ Investment
  - ↳ Superannuation
- » Pricing uncertain events and risk management
- » Actuary industry examples

Learning materials

Provided

Assessments

Assessment name	Weighting
Exercise-Scaffolded exercises with milestone submissions	20%
Case study including short answer questions and calculations	30%
Final examination – Multiple choice and short answer questions including calculations	50%

Learning activities

Lecture (2 hours)

This unit is generally taught by the head of Actuarial teaching faculty and is an excellent introduction into the role of an Actuary. Attending this unit in person is highly recommended as it is a great place to meet fellow students and ask questions, a key part of lectures. Content is very manageable, there is very little mathematics in this unit, it instead teaches gives a broad overview of the different industries Actuaries work

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Unit Guides
ACTL1002 Introduction to Actuarial Science

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in. That said, it is essential to become accustomed to the concept of present value of money as it forms the foundation of some future units.

Workshop (2 hour)

Most workshops will involve a presentation and Q&A from an industry representative that will correlate directly with the content from that week. For example, an Actuary from the health insurance sector will come in during the health insurance week.

General comments

Generally considered one of the easiest units in the degree, the idea behind this unit is to introduce students to what Actuaries do in the workplace and vast number of sectors they work in.

Some concepts in this unit form the foundation of later units. It is recommended to wrestle with time value of money now, before taking MATH2004 Theory of Interest. The life table also becomes quite important in MATH3009 Contingencies 1.

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Unit Guides
MATH1015 Linear Algebra 1

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MATH1015 Linear Algebra 1

Challenge rating	Exemption
1	None

Type of unit	Availability
Optional	Both Semesters

Prerequisites for this unit…	This unit is a prerequisite for…
None	STAT2001 MATH2004
	MATH2005 MATH2010
	MATH2011 MATH2015

Syllabus

- » Complex numbers
- » Vectors and matrices
- » Applications of matrices
- » Determinants
- » Lines and planes
- » Vector spaces
- » Eigenvectors and eigenvalues

Learning materials

Provided

Assessments

Assessment name	Weighting
Workshop Assessments	25%
Mid Semester Test	25%
Exam	50%

Learning activities

Lecture (2 hours)

Every week the lecturer would deliver a 2-hour lecture to the cohort. During the two hours the lecturer went through the content clearly and made sure that all students had a strong grasp of understanding by going through multiple examples. The lectures are usually fast paced as the lecturer has lots of examples to get through on top of the content. All lectures are recorded and stored in ILecture. At the end of each lecture, the lecturer uploads all working out and the annotated copy of the lecture itself. The lecturer also provides additional lecture notes to help students further enhance their knowledge on the topic. All these documents are accessible through Unit Materials within Blackboard.

Workshop (2 hours)

Every week there is one 2-hour workshop. During the workshop, you can either choose to go at your own pace or follow the pace of the tutor. The tutor would go through a couple of questions in the workshop and explain them in detail. The workshops are a good reflection of the questions that you can expect in

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Unit Guides
MATH1015 Linear Algebra 1

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the workshop quizzes. When there are workshop quizzes, the quiz will be during the first half of the workshop and then the workshop will proceed as normal for the second half. Some tutors encourage you to attempt questions on the whiteboard with a small group to enhance the learning experience.

Links to other units

Future units

Solving a system of linear equations is used in several other units

Matrix notation is used in a number of units.

All of the content in this unit is used extensively in MATH2010 (Linear Algebra 2)

General comments

This unit should be relatively simple to understand for those who did Mathematics Specialist in year 11 and 12. It can be chosen as a unit to help increase your course weighted average and lighten your study load for semester one. The assessments were very straightforward, and the lecturer/tutors were immensely helpful in helping you prepare for them. It's highly likely for an individual to score well in this unit if they use all the material within Blackboard wisely.

MATH1017 Advanced Mathematics 1

Challenge rating	Exemption
3	None

Type of unit	Availability
Optional Alternatively, take MATH1015 Linear Algebra 1	Semester 1 only

Prerequisites for this unit…	This unit is a prerequisite for…
It is strongly recommended for students to have achieved above 70% in ATAR Maths Specialist to take this unit.	MATH1018_STAT2001 MATH2004_MATH2005 MATH2010_MATH2015

Syllabus

- » Functions
- » Calculus
- » Sequences and Series
- » Differential Equations (DE's)
- » Matrices and Vectors
- » Other general revision of topics covered in ATAR Specialist

Learning materials

Calculus, 7th Edition by Stewart, J: unnecessary

Rest provided

Assessments

Assessment name	Weighting
Quizzes	35%
Mid semester test	15%
Examination (optional)	50%

Note:

The final exam was made optional. Students were given the option to take an oral examination. The marks in either of these were only counted to a student's final mark if it improved their mark.

Learning activities

Lecture (2 x 2 hours)

Lectures consisted mostly of the lecturer going through pre-prepared slides which had a balance of new content, example questions done by the lecturer and then exercise questions to be done individually. In 2021, lectures were only online with the option to watch live or watch the recording later (or both). Those who watched live were able to ask questions during the lecture. The length of the lectures varied week to week, with some not taking the full 2 hours. There is a significant amount of content taught, not all of which

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MATH1017 Advanced Mathematics 1

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is assessed, so it is strongly advised to stay up to date on lectures as it is a challenge to catch up. Time spent teaching a topic is not necessarily a good indication of whether it is assessable.

Workshop (2 hour)

The workshops were used as time to go over practice questions in small groups on whiteboards. Interacting with classmates was strongly encouraged and many students benefitted from the collaboration. The lecturers made themselves available to help with these questions and/or go over content again.

Links to other units

Previous units

Future units

General comments

This unit is designed as an extension unit, so naturally it covers a lot of more difficult content. However, the lecturers made effort to provide bonus marks and to organise the calculation of the final mark to give students the best chance to maximise their marks. So, while it may take more work, it does have many benefits.

This unit should only be taken by those who are passionate about mathematics and are willing to put time and effort into consistent studying. With two lectures every week covering a multitude of topics, falling behind is particularly hard to recover from. MATH1015 is a far easier alternative for those who do not care much for the intricacies of mathematics and are happy to just fulfil the minimum requirements. It is however a very rewarding unit and put you at an advantage in terms of your mathematical background for future units.

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Unit Guides
NPSC1003 Integrating Indigenous science and STEM

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NPSC1003 Integrating Indigenous science and STEM

Challenge rating	Exemption
0.5	None

Type of unit	Availability
Compulsory	Both Semesters

Prerequisites for this unit…	This unit is a prerequisite for…
None	None

Syllabus

- » Introduction to indigenous history, culture, knowledge and practices and the value and contribution of indigenous science to global challenges.
- » Written, visual and oral presentation techniques
- » Inter-cultural awareness and academic integrity
- » Scientific inquiry methods

Learning materials

Provided

Assessments

Assessment name	Weighting
Portfolio	35%
PowerPoint and presentation	30%
Scientific Writing	35%

Learning activities

Lecture (1 hours)

Generally unrelated to workshops. There were some technical difficulties, but these should be adjusted next semester. There were different speakers each week, and speakers were generally engaging.

Workshop (2 hour)

Workshops involved class discussion and were usually activity focussed. They provided students with an opportunity to meet students from other science majors.

General comments

This is essentially a required academic integrity unit, doubling up by teaching students indigenous history and culture. The unit is a requirement for all science majors, so no actuarial specific content is taught in this unit. Lectures tend to cover Indigenous practices and contributions to science, while workshops generally cover academic writing techniques. Online modules will also cover key concepts of academic writing. Group presentation is a requirement for the unit.

This is not a difficult unit by any stretch, however as assessments are largely subjective, it ended up being many students lowest mark which is unfortunate.

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Unit Guides
STAT1005 Introduction to Probability and Data analysis

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STAT1005 Introduction to Probability and Data analysis

Challenge rating	Exemption
2.5	CS1

Type of unit	Availability
Compulsory	Both Semesters

Prerequisites for this unit…	This unit is a prerequisite for…
None	STAT2001

Syllabus

- » Fundamental Probability Laws
  - ↳ Bayes Rule
- » Basic Distributions
  - ↳ Discrete Distributions
  - ↳ Continuous Distributions
  - ↳ Joint Distributions
- » Data Analysis
  - ↳ Hypothesis Testing
  - ↳ Confidence Intervals for some distributions
  - ↳ Intro to Linear Regression
  - ↳ Spearman's Rank Correlation Coefficient

Learning materials

CS1 Notes: Useful, though not critical as students from many different disciplines take this unit as well.

Rest provided.

Assessments

Assessment name	Weighting
Test 1	25%
Test 2	25%
Exam	50%

Learning activities

Lecture (2 hours)

Content has in this unit (previously two half units) rarely changes. Attendance generally lowers throughout the semester. Students have reported it is difficult to keep up with the live lecture. Most students thus completed lecture in their own time. The lecturer however was always willing to take questions.

Computer Lab (1 hour)

Teaches the fundamentals of programming in R-Studio. Delivered in a self-guided format with each new week lab sheet directly detailing what activities to be done and how to complete them. Different tutors had different teaching styles, some would walk students through most of the worksheet, others would only assist when called upon.

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Unit Guides
STAT1005 Introduction to Probability and Data analysis

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Workshop (1 hour)

Typical workshop format in which students are expected to complete a set of questions with a tutor available to assist. Students generally found completing the questions beforehand and spending the time going over difficult question or other enquiries with the tutor advantageous. As with Computer Labs, the teaching styles of the tutors varied.

Links to other units

Previous units

Future units

- » Useful skills and knowledge for future units, the statistical and R skills are core to the degree.
- » Hypothesis Testing becomes a major topic for future units, including STAT1006 which is taken in Semester 2.

General comments

Generally considered one of the more difficult units in the first year, this unit lays the foundational knowledge in statistics that are core to the degree. Students are advised to take note of their level of interest in this unit as it is largely indicative of the content taught in the rest of the degree.

The first few weeks of the unit are relatively easy for Actuarial Students as the unit goes over topics covered in ATAR Methods, however the unit proceeds to explore new topics in a thorough manner, resulting in a lot of new theory which can prove to be difficult to grasp.

Many students found that having a well-written and detailed page of notes (if permitted) for assessments was helpful, as there are a lot of formulae and distributions to remember.

Students will be introduced to the R language statistical environment, which they will use for exploring, displaying, and analyzing data, and for carrying out and reporting the results of statistical inference. It is important to keep up with how to use R, as it's a gentle introduction to coding - and R is frequently used and you're assumed to be competent with it in future units.

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Unit Guides
Exemptions this semester

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Semester 2

Exemptions this semester

Unit	Subject	Weighting
STAT1006 Regression and Nonparametric Inference	CS1	20%
FNCE2003 Business Analysis for Investment	CB2	50%

What to expect

The math split still exists. Those which chose MATH1016 Calculus 1 as opposed to MATH1018 Advanced Mathematics 2 will of course have a much easier time, hence this isn't a terribly eventful semester for most.

Most units are still shared across disciplines, and so still most students have not acquired the notes yet. This time round there are two exemptions to worry about.

Students will start to notice that STAT units take a bit more effort than the other units (with exception of advance math). This is a bit of foreshadowing for when students take up more exemption units later on.

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Unit Guides

ACTL1003 Introductory Actuarial Practices

Contribute

Table of Contents

ACTL1003 Introductory Actuarial Practices

Challenge rating	Exemption
0.5	None

Type of unit	Availability
Compulsory	Semester 2 only

Prerequisites for this unit…	This unit is a prerequisite for…
None	None

Syllabus

- » Introduction to the use of Excel with a focus on financial applications
- » Provides a mix of theoretical framework of key financial concepts:
  - ↳ accumulated value
  - ↳ discounted present value
- » Use of financial functions to solve business problems such as:
  - ↳ preparation of loan amortisation schedule
  - ↳ determination of discounted present value
  - ↳ internal rate of return for a series of fixed cash flows
- » Importance of clarity, structure and flexibility of Excel spreadsheets

Learning materials

Provided

Assessments

Assessment name	Weighting
Test	20%
Case Study	30%
Final examination	50%

Learning activities

Lecture (1 hour)

The lectures are normally fast-paced as a consequence of the shorter time. Many times, they did not run the full hour, and in some weeks, there were no lectures, at the discretion of the Unit Coordinator. The lectures are well delivered with many examples. Some financial topics were revised from the previous unit ACTL1002.

Computer Laboratory (2 hours)

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Unit Guides
ACTL1003 Introductory Actuarial Practices

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Extensive questions on the relevant week's topics, with the lecturer answering questions and providing model solutions where needed. Students found these critical to learning the content. Some students found that it was viable to miss the lecture and learn the content from the activity sheets, without an introduction.

The questions from the Computer Laboratory were often similar to the questions in assessments, so it is highly recommended that students attend the labs or make an effort to complete the questions in their own time.

Links to other units

Previous units

Time value of money from ACTL1002 Introduction to Actuarial Science.

Future units

Excel skills are used in many of the upcoming units, in particular CM1 and CM2 units. See The exemptions: Accreditation from the Actuaries Institute.

General comments

This was a critical unit for learning basic Excel functions.

The pace was very manageable and the content was interesting. Each week introduces new Excel functions and extensive practical questions are given in the workshop. The structure of modelling and spreadsheet dynamics is an underlying topic covered throughout the unit.

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Unit Guides
MATH1016 Calculus 1

Contribute

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MATH1016 Calculus 1

Challenge rating	Exemption
1.5	None

Type of unit	Availability
Optional, need MATH1015 Alternatively, take MATH1018	Both Semesters

Prerequisites for this unit…	This unit is a prerequisite for…
MATH1015	STAT2001_MATH2004 MATH2005_MATH2009 MATH2010_MATH2015

Syllabus

- » Functions
- » Differentiation techniques
- » Applications of differentiation
- » Integration techniques
- » Application of techniques
- » Multivariable calculus
- » First order differential equations
- » Second order differential equations
- » Limits
- » Convergence tests for series
- » Power series

Learning materials

Provided

Assessments

Assessment name	Weighting
Quiz	10%
Tests	40%
Final Exam	50%

Learning activities

Lecture (2 hours)

Lectures were run near identically to those in Linear Algebra 1. The lecturer would print out lecture slides for students to annotate. During the lecture, explanations were followed by some examples that the lecturer would work through to apply the concept that was just explained. After each topic in the lecture (there were often a few), there would be some exercises where students were given some time to attempt questions, then the lecturer would go through them. The lectures were a bit fast-paced at times so it was important to pay attention. All notes and answers to examples were annotated on to the lecture slides. This annotated version was uploaded after the lecture.

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Unit Guides
MATH1016 Calculus 1

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Workshop (2 hours)

Depending on your tutor, you worked through them with the other people on your table either on the board or in your books. The tutors would frequently roam to see how you were progressing and if your answers were correct. Answers to the workshop questions were available at the end of the week. On assessment weeks, the assessment would take place at the beginning of the workshop and then the class would continue as usual after.

Links to other units

Previous units

Knowledge of calculus from Maths Specialist and Maths Methods from high school is very helpful in this unit.

Future units

Differential equations in this unit are expanded on in MATH2009.

Solving First Order DE's are quite useful in STAT3005 Stochastic Processes

General comments

If you feel comfortable with weekly workshop questions and all the past assessments, then the unit should be another grade booster. Like linear algebra, the workload is pretty light. It's recommended that you start making notes for the quiz 1, test 1 and test 2 early so that you become more familiar with the content. Attendance is recorded for this unit but is not assessed. Making sure that you don't fall behind is key for this unit as new content is always introduced each week.

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Unit Guides
FNCE2003 Business Analysis for Investment

Contribute

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FNCE2003 Business Analysis for Investment

Challenge rating	Exemption
2.5	CB1

Type of unit	Availability
Compulsory	Both Semesters

Prerequisites for this unit…	This unit is a prerequisite for…
None	FNCE3000

Syllabus

- » Introduction to financial statement analysis
- » Understanding financial statements and supplementary information
- » Financial analysis techniques and applications
- » Evaluating financial reporting quality
- » Analysis of financial statement for forecasting, valuation, and risk analysis purposes

Learning materials

International Financial Statement Analysis, 4th Edition, CFA Institute Investment Series, Wiley - by Thomas R. Robinson, Elaine Henry, Wendy L. Pirie, Michael A. Broihahn, Anthony T: Useful

Most students were overwhelmed by the quantity of the readings, but practice questions and pre-reading in the textbook were useful. Content is delivered via lecture slides though so text is by no means essential.

Assessments

Assessment name	Weighting
Mid term	25%
Group assignment	25%
Final examination	50%

Learning activities

Lecture (1.5 hours)

The lectures were delivered online only in 2021, and were not very consistent in length, with some lasting 40 minutes and others over two hours. Student's response to the lectures varied. Some preferred watching the lectures live while others struggled and watched the recording at their own pace. Topics mentioned at length in lectures did not always appear in tutorial questions or assessments. Most time is spent going through a slide show, which is made available to students. The lecturer does make several annotations, so reading the slide show alone is sometimes not sufficient.

Tutorial (1.5 hour)

Tutorials were found to be very important for cementing knowledge and getting assistance with the assignments which can be time consuming. The classes were heavy in open discussion. The questions covered in tutorials were often the most relevant to the assessments.

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Unit Guides

FNCE2003 Business Analysis for Investment

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General comments

The unit introduced a lot of financial theory and required a certain level of critical thinking. Keeping up with lectures and tutorials is strongly advised. Having two assessments with a 50% weighting did prove to be daunting for some, particularly if they struggled with the first assessment.

With the combination of pre-readings, lectures and workshops there is a lot of content delivered in this unit, so having an effective note-taking method can become a strong asset in taking this unit. The students which excelled at this unit were often the ones who were the most organised.

Students already familiar with financial statements from Accounting and Finance ATAR had a slight advantage with this unit, however, the lecturer explained all concepts thoroughly enough for everyone to catch up with ease.

This unit is technically a second year unit, which is shared with many Bachelor of Commerce students. Since the assignment was a group project, being part of a well-motivated and dependable group is highly advantageous.

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Unit Guides
MATH1018 Advanced Mathematics 2

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MATH1018 Advanced Mathematics 2

Challenge rating	Exemption
3.5	None

Type of unit	Availability
Optional Alternatively, take MATH1016	Semester 2 only

Prerequisites for this unit…	This unit is a prerequisite for…
MATH1017	STAT2001 MATH2004 MATH2005 MATH2009 MATH2010 MATH2015

Syllabus

- » Multivariable Calculus
- » Differential Equations (First and Second Order)
- » Vector Spaces and Subspaces
- » Regression using Least Squares Method and Pseudoinverse
- » Quadric Surfaces
- » Power Series solutions of Differential Equations
- » Fields and Vector Spaces
- » Derivative Maps
- » Topology
- » Functions
- » Linear Algebra

Learning materials

Textbook reference:**, Calculus, 7th Edition by Stewart, J**: useful, but not required

Useful as a supplementary resource and provides additional practice questions with answers. It is far from essential, however, and high performing students will not require it.

Assessments

Assessment name	Weighting
Quizzes	35%
Mid-semester test.	15%
Examination	50%

Learning activities

Lecture (2 hours)

The lectures were very similar to those delivered in Advanced Mathematics 1. The lecturer would go through lecture slides on the projector, making annotations along the way and explaining topics in great detail. Lecture slides and annotated slides were made available to students. The content from the lectures was the most assessed content. Recordings of lectures were made available to students. Exercise

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Unit Guides
MATH1018 Advanced Mathematics 2

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questions were made available to students at the end of the lecture, and answers were released at the end of the week.

Workshop (1 hour)

Unlike Advanced Mathematics 1, the workshops were used to teach more content, rather than a class to work through practice questions. The topics taught in the workshop were often extending on topics taught in the lectures. Not all of the content taught in the workshop was assessable, but the tutor and lecturer clearly communicated which topics were to be assessed.

Due to the density of the lecture material, the workshop questions provided are a good opportunity to ensure a comprehensive understanding of the topic. They often raise applications of the topics themselves. Further on, the workshop materials also serve as good exam/test drilling materials as you are able to find some questions in the exam/test derived from the workshop questions themselves

Seminar (1 hour)

Like the workshops, seminar were also used to teach knew content, however, the content of the seminar was less related to the lecture. The seminars explored fundamental concepts of pure math such as topology, not all of which would be assessed, but is more for the general interest of the students.

Links to other units

Previous units

Linear algebra, limits, calculus from MATH1017 (Accelerated Mathematics 1) are all relevant.

Future units

Differential equations and directional derivatives are important in MATH2009 (Calculus 2) and integrating factor type differential equations are used in STAT3005.

General comments

Generally considered one of the hardest units of the first year, it covers a lot of content, not all of which is assessed. It is *strongly advised* to pay attention to which topics will be assessed and to focus your study on these.

This unit is designed to be an extension unit, so the topics covered can be quite challenging. Particularly, the workshops and seminars explore a lot of new ways of thinking and complex mathematics. Like MATH1017, the lecturer made accommodations to account for the difficulty in content. For example, only your best 4 out of 6 questions would be counted.

The most successful students in this unit were the ones who were both highly motivated and interested in the topics. It is not recommended to take this unit if you do not have a passion for mathematics or if you are not looking to be challenged. In saying that, taking this unit can be highly rewarding as the extra content can come in handy for future units.

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Unit Guides
STAT1006 Regression and Nonparametric Inference

Contribute

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STAT1006 Regression and Nonparametric Inference

Challenge rating	Exemption
2	CS1

Type of unit	Availability
Compulsory	Semester 2 only

Prerequisites for this unit…	This unit is a prerequisite for…
None	STAT2003

Syllabus

» Non-parametric hypothesis testing
  ↳ Sign Test
  ↳ Signed-rank Test
  ↳ Rank-Sum Test
  ↳ ANOVA
  ↳ Kruskal-Wallis Test
  ↳ Permutation Tests and Bootstrapping
» Correlation
» Regression
  ↳ Simple linear regression
  ↳ Multiple linear regression
  ↳ Assessing model adequacy
  ↳ Goodness of Fit
  ↳ Transformations
  ↳ Variable selection methods
  ↳ Q-Q Plots

Learning materials

CS1: Recommended, though not essential as students from other disciplines also take this unit

Assessments

Assessment name	Weighting
Test Portfolio	20%
Technical Report	30%
Final exam	50%

Learning activities

Lecture (2 hours)

The lectures often did not last the full two hours but were packed with information. High achieving students found that pre-reading lecture slides was extremely useful for this unit. The lecturer was eager to take questions and encouraged students to ask.

Lectures often focussed on the theory behind the concepts taught, while the Computer Labs were used to practice applying these concepts to questions.

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Unit Guides
STAT1006 Regression and Nonparametric Inference

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Computer Laboratory (2 hours)

The labs involved a weekly structured set of R question with the tutor going through each question. Attendance was often critical as the lecture often only dealt with theory and much of the R coding techniques were taught in the laboratory. High achieving students found that completing the questions before the Lab individually, and then using the Lab as time to ask questions and revise, significantly helped.

Links to other units

Previous units

Hypothesis testing and some of the statistical distributions from STAT1005 is expected to prove useful in this unit.

Overlap

Least Squares Regression using Matrices also occurs in MATH1018

Future units

Regression is used again when looking at CAPM and multifactor models in STAT3006.

General comments

This unit is a critical unit for the degree as it sets the foundations for STAT units in following years. To improve your chances of doing well on this unit, it is advised that you stay up to date with lectures - making sure to understand the fundamental theory, complete all Lab questions, and become familiar with R Markdown and all the R commands (some students found having a word document/list of commands helpful).

Quizzes were held online and focussed mainly on theory and calculations, while the assignment required thorough working out and sound use of statistical investigation methods.

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Second Year

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Exemptions this semester

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Semester 1

Exemptions this semester

Unit	Subject	Weighting
STAT2001 Mathematical Statistics	CS1	20%
MATH2004 Theory of Interest	CM1	33%
FNCE3000 Corporate Finance	CB1	50%

What to expect

The biggest challenge this semester is the bump up in content. Second year units are much heavier than first year units. In addition, this is the semester in which students encounter their first full Actuarial unit, MATH2004 Theory of Interest. These are units that are (generally) exclusively taken by Actuarial students. These units follow the notes religiously and are faster paced. It is at this point that most students acquire their first set of notes. Do not be scared off, students adjust after a few weeks.

Students have their first Elective unit this semester. Please check the course handbook for options. The most popular choices (and thus a good starting point) are COMP1005 Fundamentals of Programming and MATH2009 Calculus 2, though there heaps of interesting choices. These are not exempt and do not carry any value in terms of the degree so it is recommended that students choose whatever sounds most interesting to them. If students are terribly indecisive, python is becoming increasingly valuable to employers so we would recommend looking into the COMP units, though bear in mind that a first-year unit won't offer much beyond what can be learnt via individual study.

Some have started applying to internships. See Internships/Vacation programs.

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Unit Guides
STAT2001 Mathematical Statistics

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STAT2001 Mathematical Statistics

Challenge rating	Exemption
3	CS1

Type of unit	Availability
Compulsory	Semester 1 only

Prerequisites for this unit…	This unit is a prerequisite for…
MATH1015 or MATH1017	STAT3005 MATH3005
MATH1016 or MATH1018	STAT3001 STAT3002
STAT1005	STAT3000

Syllabus

- » Expectation, correlation and covariance
- » Order statistics and functions of random variables
- » Generating functions
- » Multivariate distribution
- » Conditional distributions and expectation
- » Extreme value theory
- » Methods of estimation and properties of estimators
- » Bayesian statistics

Learning materials

CS1: Useful, though not necessary

Jay L., D. & Kenneth N., B. (2012) Modern Mathematical Statistics with Applications. 2. edition. New York, NY :, Springer New York: useful though not necessary

The unit outline recommends various textbooks (this year's unit outline includes 9 different texts), some of which are accessible online through the library. Many of these only include notes on a single topic and often provide far more detail than is required in the unit and so were often ignored by most.

Assessments

Assessment name	Weighting
Test	20%
Group exercise	20%
Final exam	60%

Learning activities

Lecture (2 hours)

The lecturer utilised slides, frequent examples and working through an overhead projector to teach concepts, often attempting to engage the audience with questions.

Overall, most topics were explained quite clearly and thoroughly. However, the lecturer did move quickly through some of the complex concepts due to the large breadth of topics.

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Unit Guides
STAT2001 Mathematical Statistics

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Tutorial (1 hour)

The questions in tutorials were very similar to those in workshops. Some solutions had minor errors, though these would be corrected quickly if pointed out. R was used far less frequently than in prior units such as STAT1006

Workshop (1 hour)

Questions were similar in nature to those from workshops. Some workshops were quite thorough and thus more difficult than others, though this proved to be useful in revision for assessments. Some solutions had minor errors, though these would be corrected quickly if pointed out.

General comments

The lecturer was open to students dropping by and asking for help.

The tutorials were an opportunity to try attempt questions and receive feedback and assistance from the lecturer, they were not however, designed to teach the absolute basics.

The real differentiator in this unit is often time, students who are not completely familiar with concepts will often be unable to complete timed assessments. It is therefore very important to practice a high volume of questions in preparation for assessments.

Links to other units

Previous units

STAT1005 provides elementary knowledge that this unit builds on. Note that the important topics are revised at the beginning of this unit but it is handy to have some recollection of them.

Future units

Knowledge from this unit is fundamental for many later units. Almost every topic (with the acceptation of order statistics) from this unit is used again in third year. It is advised that you keep your notes for this unit as they will come in handy later.

MLE is used extensively in future statistical units

An understanding of expectation of random variables is important in MATH3006 (Life Contingencies 1). An understanding of joint probability comes in handy when studying MATH3007 (Life Contingencies 2).

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Unit Guides
MATH2004 Theory of Interest

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MATH2004 Theory of Interest

Challenge rating	Exemption
2.5	CM1

Type of unit	Availability
Compulsory	Semester 1 only

Prerequisites for this unit…	This unit is a prerequisite for…
MATH1015 or MATH1017	MATH3005 MATH3006
MATH1016 or MATH1018	STAT3006

Syllabus

- » Cashflow models and time value of money
- » Interest rates
- » Level and increasing annuities
- » Equations of Value
- » Real and money interest rates
- » Loan Schedules
- » Project Appraisal
- » Bonds, equity and property
- » Term Structure of Interest Rates
- » Redington immunisation

Learning materials

CM1: very useful though not crucial

While the lecture notes were sufficient to perform well in this unit, using the notes may prove useful as an additional resource for those who like to understand concepts more deeply and have a more gentle introduction to topics.

Assessments

Assessment name	Weighting
Test	10%
Group exercise	25%
Final exam	65%

Learning activities

Lecture (2 hours)

The lecture notes were essentially a digestion of the CM1 notes. They consisted mostly of examples and each one was solved from start to finish. They were presented using handwritten notes that were projected onto the screen using a camera extracted from the learning materials.

Tutorial (1 hour)

Questions were based on CM1 past papers and so were very good for revision. Some questions on topics were included prematurely, though they were obvious to spot and it was recommended that students return to these after learning the additional content. These future topics were not included in assessments until they were formally taught.

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Unit Guides
MATH2004 Theory of Interest

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Workshop (1 hour)

Workshops were scheduled directly after lectures and were essentially a continuation of the lecture.

Links to other units

Previous units

Actuarial notation for annuities and time value of money was briefly covered in ACTL1002. Sufficient excel skills were learnt in ACTL1003

Basic calculus and the ability to solve a set of simultaneous equations are used, however they are not particularly difficult concepts to grasp.

Future units

All of the notation and foundational concepts covered in the first 4 weeks of this unit also form the (assumed and not retaught) basis of MATH3006 (Life Contingencies 1) in which these concepts are extended to include a probabilistic allowance for mortality in life insurance contracts.

The general theory of interest rates, in particular the concept of the force of interest is useful in STAT3006 (Financial Engineering 1).

General comments

This is the first full "actuarial" unit encountered by students and the workload is appropriate as such. This means it is a lot more than students are used to, though most adjust relatively quickly. This shouldn't stand too far out from STAT2001 in terms of volume, though STAT2001 isn't as actuary focused as this unit.

For many, this is the first unit in which the usefulness of the notes starts to become apparent, and it is at this point that many start acquiring the notes and using them.

The previous course structure made this unit far tougher, though this was altered in 2021 and therefore it is recommended to ignore horror stories from graduates. Understanding and becoming comfortable with the fundamental topics of time value of money and interest rates is key to success in this unit. If understood fully, later topics are far simpler. You will be rewarded for effort in this unit, practice will make perfect. That said, it is very easy to make a lot of tiny errors in CM1 units.

As of 2021, the final week's content (Term structure of interest rates) is perhaps the most content heavy week in contrast to the usual end of semester content slump. Should this continue, it is advised to plan accordingly. We suggest you check the published unit outlines.

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Unit Guides
FNCE3000 Corporate Finance

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FNCE3000 Corporate Finance

Challenge rating	Exemption
2	CB1

Type of unit	Availability
Compulsory	Both Semesters

Prerequisites for this unit…	This unit is a prerequisite for…
FNCE2003	None

Syllabus

- » Risk, return and cost of capital
  - ↳ The Capital Asset Pricing Model (CAPM)
  - ↳ The Weighted Average Cost of Capital (WACC) method
- » Capital Structures
  - ↳ Equity vs Debt Financing
- » Mergers and Acquisitions
- » Corporate Governance

Learning materials

CB1: Not necessary. This unit is shared across disciplines and does not have an actuarial focus. The notes therefore are not required.

Berk, J. & DeMarzo, P. 2017, Corporate finance, global edition, 4th ed, Pearson Education: Very useful, but not essential.

While the lecture slides were sufficient to perform well in this unit, using the textbook may prove useful as an additional resource for those who like to understand concepts more deeply.

Assessments

Assessment name	Weighting
Assignment 1	50%
Final exam	50%

Learning activities

Lecture (2 hours)

Weekly lectures were largely a very condensed version of the relevant textbook chapters. Students often found these moved at a rapid pace and required going back over the textbook later. They were easily followed, though the textbook helped tremendously to grasp content fully.

Tutorial (1 hour)

Each week brought a new set of tutorial questions which students could work on in the tutorials. Students found these tutorials useful to clarify understanding, especially for corporate finance topics that were assumed knowledge going into the unit. These were sourced from the textbook.

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Unit Guides
FNCE3000 Corporate Finance

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Links to other units

Future units

The CAPM model taught in this unit will return in greater detail in STAT3006

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General comments

This unit has been added into the syllabus to cover off the CB1 exemption. Since this is a third-year finance unit there were some accounting topics which were taken as assumed knowledge that had not been covered in the Actuarial degree. Students however, did not find any of these too challenging and generally scored well in this unit.

As of Semester 1 2021, the assignment for this unit was immensely heavy. It was a lot of content and informal research spread between not a lot of people. Students found they invested an exorbitant amount of time into this. Nonetheless, it was not hard to score well as it was clearly a guided exercise.

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Unit Guides
Exemptions this semester

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Semester 2

Exemptions this semester

Unit	Subject	Weighting
ECON1001 Actuarial Economics	CB2	100%
STAT3001 Statistical Modelling	CS1 + CS2	20% + 25%
STAT3005 Stochastic Processes	CS2	25%
STAT3006 Financial Engingeering 1	CM2	33%

What to expect

This is the semester with the most exemption units. All of these are content heavy, and things are starting to get a bit more complex. Students will have gotten accustomed to STAT units being heavier and might be worried about having three lined up. Rest assured; this is not an overwhelming amount of statistics. For one, STAT3006 Financial Engingeering 1 cover CM2, which is completely different to the CS1 units covered up to this point. The CS2 units are closer to those of CS1, albeit with less hand-waving. The result is less statistics (and R) than students might first expect. The 3000 codes are intimidating at first, but they are forgotten extremely quickly. That said, this is still a difficult semester. For context, the step up is about as much as from first to second year. In a nutshell: Each unit is full on from now on, compared to only one or two full on units per semester.

Do not be scared off by the difficulty; on the other side of the coin, content is far more enjoyable. Things are less generic and more interesting. Other disciplines aren't doing what you're doing anymore, and students finally feel like they're working towards becoming an actuary.

As a heads up to those chasing exemptions, ECON1001 Actuarial Economics covers CB2 in full, and so the 73 required average becomes the minimum required mark.

More are applying to get in on summer vacation programs. See Internships/Vacation programs.

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Unit Guides
ECON1001 Actuarial Economics

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ECON1001 Actuarial Economics

Challenge rating	Exemption
2.5	CB2

Type of unit	Availability
Compulsory	Semester 2 only

Prerequisites for this unit…	This unit is a prerequisite for…
None	None

Syllabus

» Microeconomics
  ↳ Introduction, Supply & Demand, Elasticity
  ↳ Consumer Demand & Uncertainty
  ↳ Competition
  ↳ Product, Marketing & Advertising; Growth & Pricing Strategies
» Macroeconomics
  ↳ Government Intervention in Markets
» Government and the Firm
  ↳ Supply Side Policy
  ↳ International Trade, Balance of Payments and Exchange Rates
  ↳ The Macroeconomic Environment, Money and Interest Rates
  ↳ Business Activity, Unemployment & Inflation, Demand side Macroeconomic Policy

Learning materials

CB2: Not particularly useful

The Notes take on a different form this time, where instead of delivering content, students are guided through the textbook.

Economics for Business. 7th edition By J Sloman: Required to use the notes, useful otherwise.

In contrast to the lecturer's recommendation, strong candidates will perform well without the notes or the textbook, especially if a lot of practice is done via CB2 past papers. The text does however provide students with additional nuance to fully understand topics. Whether that's worth the immense reading load, is up to individual students.

Lastly, there is a tendency for the notes itself to provide examples based on the UK economy as the notes itself are published in the UK.

Assessments

Assessment name	Weighting
Scaffolded e-tests	25%
Midsemester test	15%
Final Exam	60%

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Unit Guides
ECON1001 Actuarial Economics

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Learning activities

Lecture (2 hours)

The lecturer primarily used very long PowerPoint presentations which often included real world examples. Alongside long slides, lectures were short as well. This translated to the lecturer flicking through slides, explaining important concepts and urging students to read others on their own.

Tutorial (1 hour)

In weeks with a lot of content these were used to finish off the lectures. Otherwise they were used to expand on some concepts by providing real world examples and closer to exams they served as revision. Very much informal (besides the weeks where lectures needed to be completed).

Workshop (1 hour)

They involved going through practice questions at which some can be founded from the CB2 notes, the answer of the questions nicely summarizes the main point of each chapter. Workshops typically thrive with discussion and therefore the lecturer encouraged interruptions to clarify some concepts.

These were used for the frequent e-tests and there is a tendency for some practice questions to turn up in the exam.

Links to other units

Previous units

This unit is a lot easier if students had done economics in high school.

Overlap

A few economic concepts such as utility theory are also encountered in STAT3006.

General comments

This unit has a lot of rote learning. It is crucial to recognise the foundational knowledge of each topic as most content is just an expansion or result of it. It is recommended to not simply memorise everything that is thrown on screen as students will quickly find themselves overwhelmed. The first two weeks are particularly content heavy for beginners but do not be scared off by this.

This is the only unit that covers CB2 as opposed to several units covering a single exemption which explains why this unit is so content heavy. Students aiming to maximise exemptions are therefore warned as the 73 average becomes the minimum mark for exemption. That said, CB2 is viewed as the "easiest" exemption by most actuarial candidates which leads to the unit being of average difficulty.

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Unit Guides
STAT3001 Statistical Modelling

Contribute

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STAT3001 Statistical Modelling

Challenge rating	Exemption
3.5	CS1 + CS2

Type of unit	Availability
Compulsory	Semester 2 only

Prerequisites for this unit…	This unit is a prerequisite for…
STAT2001 STAT1006	

Syllabus/ Topics

- » Regression Models
    - ↳ Linear Regression
    - ↳ Generalised Linear Models (GLM)
    - ↳ Logistic Regression
    - ↳ Loglinear Regression
- » Time Series Analysis
    - ↳ Auto Regressive Models (AR)
    - ↳ Moving Average Models (MA)
    - ↳ ARMA, ARIMA and SARIMA models.

Learning materials

CS1 and CS2: Useful.

Content was explained in a slightly different (arguably better) order to that from the notes. If this remains the same, it's recommended that students prioritise unit content above the CS1/CS2 notes in order to save valuable study time, later using the notes as additional practice.

Assessments

Assessment name	Weighting
Test 1	20%
Test 2	20%
Final Exam	60%

Learning activities

Lecture (2 hours)

In lectures material was presented along with explanation. Concepts were then demonstrated through examples. Derivation was largely ignored and some concepts were skimmed over, though assessments and tutorials later proved these to be quite important.

Content, although definitely based on the CS1 and CS2 syllabus, wasn't presented in the same order. The order presented made topics easier to approach, though students that only used the notes would be annoyed slightly as they either had to follow lectures or not be able to follow tutorials as easily.

Computer Lab (1 hour)

These were essentially a sandbox to experiment and familiarise oneself with the content. These were R based and although assessments didn't require R as of 2021, interpretation of graphs and output were assessed. Solutions were only released once every lab had finished.

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Unit Guides
STAT3001 Statistical Modelling

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Tutorial (1 hour)

Tutorials were the backbone for mathematical exploration of topics which turned into most of the assessable content. Again, these solutions were only posed once all tutorials elapsed. As mentioned, the math which was often glossed over in the lecture proved to be quite useful in the tutorials (though not terribly in-depth.

Links to other units

Previous units

Knowledge of regression from STAT1006 is useful when dealing with generalised linear models. In fact the first few weeks feel identical in style to STAT1006

Knowledge of maximum likelihood estimation from STAT2001 is important for Generalised Linear Models.

Solving systems of linear equations from MATH1015

Overlap

Knowledge about covariances and stationary processes from STAT3005 is used in time series.

General comments

The assessments during semester for this unit were quite manageable however the exam was much more difficult. Practice tests were provided for the two semester tests and the exam more closely resembled the difficulty of these. Furthermore, the content in each week built on previous weeks so it was crucial to stay up to date.

Overall the unit came across as slightly confused. The content leans heavily towards computing, though no true R usage was explicitly required. This was not aided by the content not following the CS1 and CS2 notes (even if it is arguably a better presentation) as closely. If this remains the same, it's recommended that students prioritise unit content above the CS1/CS2 notes in order to save valuable study time, later using the notes as additional practice. It should be noted that the unit has undergone significant change, including a new lecturer, therefore much can change. Irrespective, these are by no means barriers to enjoying the content and scoring well.

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Unit Guides
STAT3005 Stochastic Processes

Contribute

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STAT3005 Stochastic Processes

Challenge rating	Exemption
3.5	CS2

Type of unit	Availability
Compulsory	Semester 2 only

Prerequisites for this unit…	This unit is a prerequisite for…
STAT2001	

Syllabus

- » Stochastic processes
- » Markov chains
- » Two state Markov model
- » Time homogeneous Markov jump process
- » Markov jump process
- » Principles of actuarial modelling

Learning materials

CS2: Essential

Assessments

Assessment name	Weighting
Test 1	20%
Test 2	15%
Final Examination	65%

Learning activities

Lecture (2 hours)

In 2021 the first and second halves of the unit were presented by two different lecturers with drastically different teaching styles.

The first half was presented in an intuitive manner with less emphasis on derivation. These slides were difficult to go through without explanation from the lecturer, though they followed the CS2 notes exactly, including the same examples.

The second half was essentially a regurgitation of the CS2 notes. Additional intuition was rarely included meaning that students would often read through the CS2 notes on their own without attending lectures.

Naturally intuition based students much preferred the first half, whereas students that loved complex derivation preferred the second.

Tutorial (1 hour) & Workshop (1 hour)

The workshops and tutorials were similar in that they both consisted of being given a set of questions which the lecturers then went through for the class. Sometimes in the tutorials, questions were given, and it was simply time that you could go through material and ask the tutor any questions you had.

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Unit Guides
STAT3005 Stochastic Processes

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The first half of questions included an example of each of the main types of questions that could be asked which made it clear how much students understood. These were often quite long, but proved to be very useful, especially in revision.

The second half of questions were often shorter and thus less complete. A lot of "out of the box thinking" type questions were included, which together with there not any questions in the first place, made it quite tough to know where students stood with base content.

Links to other units

Previous units

Knowledge of expectation of random variables, in particular covariance and correlation from STAT2001 (Mathematical Statistics) are picked up where left off immediately.

First Order differential equations from MATH1016 (or more recently MATH2009 as an optional first semester unit) are used throughout the second half of the unit.

Solving systems of linear equations from MATH1015

The stochastic processes are covered at a basic level in INDE2000 (optional unit).

Overlap

Stationarity is revisited in STAT3001

Future units

Two state, binomial and Poisson models are used in MATH3008 Survival Models & Analysis

General comments

The difficulty of this unit varies throughout the course of the semester. Some of the later topics were quite challenging (noteworthy were the Kolmogorov Differential Equations and Duration Dependence), while earlier parts of the unit were comparatively quite simple to grasp. This is not a terribly difficult unit in terms of content, though unfortunately this was realised retrospectively for most. A lot of practice will be required to get used to concepts as unfortunately a lot of intuition is lost by a slight over-emphasis on derivation, particularly in the second half. Our commentary will therefore largely be focused on the second half.

In the second half, it is crucial to keep in mind that it is essentially a single topic being taught with a lot of variations. "Big picture thinking" will make the content much less intimidating as it narrows the content down to a few key ideas which can be hammered down until understood. This will free you up to then be able to be able to move on to the "out of the box thinking" questions from tutorials and workshops.

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Unit Guides
STAT3006 Financial Engingeering 1

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STAT3006 Financial Engingeering 1

Challenge rating	Exemption
3.5	CM2

Type of unit	Availability
Compulsory	Semester 2 only

Prerequisites for this unit…	This unit is a prerequisite for…
STAT2001	STAT3010

A new lecturer will be taking this unit from 2022 onwards, and so commentary is expected to change significantly.

Syllabus

- » Efficient Market Hypothesis (EMH)
- » Utlility Theory
- » Stochastic Dominance and Behavioural finance
- » Measures of Investment Risk
- » Stochastic Models of Investment Returns
- » Portfolio Theory
- » Models of Asset Returns
- » Capital Asset Pricing Model (CAPM)

Learning materials

CM2: Essential

Assessments

Assessment name	Weighting
Test 1	10%
Group Assignment	25%
Final Exam	65%

The group assignment required students to read ahead in CM2 which made things a bit tougher.

Learning activities

Lecture (2 hours)

Lectures are generally presented in the format of the handwritten lectures notes on the relevant chapters of CM2 notes. However, the lecturer will often add details that are skipped over in the notes and a lot of industry knowledge. Many students found that simply reading the relevant chapters and going back to the lectures when confused a successful strategy in this unit. Lecture slides were a good summary to refer to having learnt the content.

Tutorial (1 hour) & Workshop (1 hour)

Generally, tutorials consisted of past IFoA exam questions which students worked on and the lecturer then presented solutions. There were far more questions than what would be done, which although aiding revision, punished those who stubbornly attempted to do them all. While useful they were often completed

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Unit Guides
STAT3006 Financial Engingeering 1

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by hand which doesn't follow the excel based format of the assessments in this unit. Attendance was therefore recommended (reasoning will be explained in the workshop section) but by no means crucial.

The workshops meanwhile were completed in Excel and were thus found to be extremely useful by all students. A problem was presented and students were expected to collaborate in order to solve it with the lecturer frequently chiming in. Students often found themselves lost and unable to start, as these had no guidance questions pushing you towards an ultimate solution. It was therefore crucial to stay up to date with content – Tutorials aided this, as these questions were more of a guiding nature and were presented before the workshop. Workshops were worth attending simply due to the lecturer's additional industry insight and strong emphasis on the feasibility and limitations of methodologies.

Links to other units

Previous units

STAT1005 Knowledge of expectation of random variables, in particular covariance and correlation from STAT2001 (Mathematical Statistics) are very useful in stochastic processes. (optional unit).

Force of interest and increasing annuities from MATH2004

Overlap

A few economic concepts such as utility theory are also encountered in ECON1001 Actuarial Economics.

Future units

Lognormal model result discussed in STAT3010 Financial Engineering 2

General comments

A new lecturer will be taking this unit from 2022 onwards, and so commentary is expected to change significantly.

Generally, this unit is considered easier than Financial Engineering 2, however this unit will still require significant investment of time by students. The lecturer seems to prefer an excel based assessment format and thus prioritising workshops is highly recommended. It is useful to learn to navigate excel quickly and efficiently so it doesn't get in the way, particularly during assessments. We recommend using YouTube to research shortcuts. Otherwise ACTL1003 has equipped students with the necessary excel skills.

It's recommended to not fight the flow of this unit as a lot of time can be wasted this way. For example, force of interest is the de facto rate used in the unit whereas the notes use various forms of interest. Furthermore, the notes oversimplify some concepts, whereas the lecturer prefers the more correct descriptions. In short, the lecturer's and notes' answers will often be slightly different. Follow the lecturer's approach. This will drastically simplify things as the lecturer remains consistent throughout the unit.

The unit materials were quite disorganised on Blackboard. Solutions to questions were uploaded in a rather sporadic way. Some solutions were handwritten, some excel files whilst others had to be sourced from past paper solutions.

The first topic of EMH is primarily theoretical which isn't representative of the unit as a whole which remains very much mathematical.

Some previous topics were also revisited, though no unrevised first year concepts will appear in assessments.

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Third Year

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Unit Guides
Exemptions this semester

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Semester 1

Exemptions this semester

Unit	Subject	Weighting
MATH3009 Contingencies 1	CM1	33%
STAT3010 Financial Engineering 2	CM2	33%
MATH3008 Survival Models & Analysis	CS2	25%

What to expect

Disclaimer: this is written from the Actuarial Science Major perspective. Please see A Comparison of Third Year Streams.

There is another elective unit this semester. Just like before, choose one which interests you most. A strong recommendation would be INVE3000 Introduction to Derivative Securities. This unit has tremendous overlap with STAT3010 Financial Engineering 2, albeit less "financial engineer-y" (easier). As FE2 is immensely difficult (conceptually), getting exposed to some concepts in the Derivatives unit first proves to be quite helpful.

Congratulations, you have arrived. The degree is not holding back anymore. There is no material increase content, but this time round things are just harder to comprehend (FE2) or require more practice to master (Contingencies). Again, do not be scared off by the difficulty. You will adjust just like the last few times. At this point in the degree, all eyes are on graduation, so commitment is high. Additionally, it helps that content is extremely interesting. If students were able to cope fine enough last semester, they should have no issue this semester.

Many students will be focused on landing a graduate role this semester. See Graduate programs.

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Unit Guides
MATH3008 Survival Models & Analysis

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MATH3008 Survival Models & Analysis

Challenge rating	Exemption
3.5	CS2

Stream	Availability
Actuarial Science Major and Actuarial and Applied Statistics Major	Semester 1 only

Prerequisites for this unit…	This unit is a prerequisite for…
MATH2004 Theory of Interest STAT2001 Mathematical Statistics	

Syllabus

» Survival Models and the Life Table
» Estimating the Lifetime Distribution
» Proportional Hazard Models
 ↳ Cox Proportional Hazard
» Binomial and Poisson Models
» Exposed to risk
» Statistical Tests for Graduation
» Methods of Graduation
» Lee Carter model
» Splines

Learning materials

CS2: Essential

Assessments

Assessment name	Weighting
Blackboard test	3%
Test 1	12%
Test 2	20%
Final Exam	65%

Learning activities

Lecture (2 hours)

As this was another "two part" unit, two different lecturers were used for the two halves of the semester.

The first set of lectures were more illustrative in nature, rather than focusing on teaching students the absolute basics. It was therefore highly recommended to read the notes ahead of the lecture in order to get the most out of the R examples.

The second set of lectures were more teachable in nature. It was less necessary to read the notes ahead of time as the lecturer summarised key concepts, but also included most everything you would need to know.

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Unit Guides
MATH3008 Survival Models & Analysis

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These were had more pen and paper examples (although students were encouraged to do these in excel as it would mirror assessments).

Tutorial (1 hour)

The first half of tutorials focused on handwritten examples to ensure students understood the core workings of the content. The first question was always a summary of the core topic for the week. This was particularly useful for students that didn't get it exactly right the first time round. Tutorials were very useful to be able to answer MCQ's and matching questions in the assessments.

The second half of tutorials took past paper examples and students were required to do these in excel to mirror assessments. Students were encouraged to ask questions and spark debate and answers were briefly discussed before moving on to the next example.

Computer Lab (1 hour)

The first half of labs were completely R based. As usual students need not understand each individual bit of code as these examples were more complex than would be found in an assessment. That said, a good working knowledge of the core code is essential as these would crop up in assessments.

The second half of labs were completely excel based. Many of these were large datasets to simulate real world application and the techniques utilised to tackle these came up in simpler examples during assessments.

Links to other units

Previous units

Knowledge of hypothesis testing from STAT1005. Weaknesses in some students' knowledge were exposed, but could easily be relearnt for use in the statistical tests.

MLE from STAT2001.

Results from poisson, binomial and two state models taught in STAT3005 Stochastic Processes formed the backbone of most content.

Overlap

The first ~2 weeks of content is mirrored almost exactly in MATH3009 Contingencies 1, albeit with some R.

General comments

This was not a very difficult unit in the lineup of CS2 units. The second half of the unit felt particularly mechanical in nature. As such, core understanding of hypothesis testing was particularly useful to not fall over your own feet. For example, knowing that all Chi-square tests are right tailed saved you the hastle of fumbling the required tail.

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Unit Guides
MATH3009 Contingencies 1

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MATH3009 Contingencies 1

Challenge rating	Exemption
4.5	CM1

Stream	Availability
Actuarial Science Major	Semester 1 only

Prerequisites for this unit…	This unit is a prerequisite for…
MATH2004 Theory of Interest	MATH3010 Contingencies 2

Syllabus

- » Survival Models and the Life Table
- » Life Assurance Contracts
- » Life Annuity contracts
- » Evaluation of Assurances & Annuities
- » Variable Benefits & Conventional With-Profit
- » Gross Premiums
- » Gross Premium Reserves
- » Mortality Profit

Learning materials

CM1: Essential

Assessments

Assessment name	Weighting
Test 1	10%
Test 2	25%
Final Exam	65%

Learning activities

Lecture (2 hours)

Lectures consisted of proving results and then illustrating some examples. Students that read the notes ahead of lectures admittedly didn't get a lot out of these. Those who didn't naturally found these more useful.

Tutorial (1 hour)

CM1 units require a lot of practice and questions have many small variations. The result was that tutorials were absolutely stacked with content. Do not be fooled by the allotted 1 hour timeframe as some students often found themselves spending in excess of 3-4 hours to properly comb through each question and learn nuances. Assessments very much mirrored this and were also quite time limiting, though perhaps not quite to the extent of tutorials as it would not be your first time working through examples.

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Unit Guides
MATH3009 Contingencies 1

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Workshop (1 hour)

Workshops were initially a slower paced tutorial but turned into excel workshops. These were essentially tutorial examples done from first principles as opposed to just using the tables. Solutions were not released so students are encouraged ot attempt these as some assessments included excel.

Links to other units

Previous units

This unit essentially takes MATH2004 Theory of Interest and introduces life contingent events, i.e. cashflow conditional on survival or mortality.

This unit houses the return of the life table from ACTL1002 Introduction to Actuarial Science.

Overlap

The first ~2 weeks of content is mirrored almost exactly in MATH3008 Survival Models & Analysis, albeit without R and more emphasis on the life table.

General comments

The first week or two of the unit (Survival models and the Life Table) are introductory and quite a bit easier than the rest.

While not conceptually difficult, this unit is quite challenging. Questions contain a lot of nuance and variants to keep track of. Equations are long with a lot of computation and looking up values in the tables which is time consuming and frankly tedious. This often adds up to quite a few marks lost along the way. The UC has addressed the computation aspect and most questions in assessments no longer required full working. This was greatly appreciated by many, however more questions can now fit in the allotted assessment time, meaning that more of those question variants crop up.

It is recommended that students focus on the core topic to anchor their understanding, and then investigate how to manipulate a baseline equation to fit all variants. This saves half a beat at every step and quickly adds up.

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Unit Guides
STAT3010 Financial Engineering 2

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STAT3010 Financial Engineering 2

Challenge rating	Exemption
5	CM2

Stream	Availability
Actuarial Science Major	Semester 1 only

Prerequisites for this unit…	This unit is a prerequisite for…
STAT3006 Financial Engingeering 1	

It's anticipated that a new lecturer might be taking this unit from 2023 onwards, and so commentary is expected to change significantly.

Syllabus

» Brownian motion and martingales
» Stochastic calculus and Ito processes
» Stochastic models of security prices
» Characteristics of derivative securities
» The binomial model
» The 5-step method in discrete time
» The Greeks
» The Black-Scholes option pricing formula
» The 5-step method in continuous time

Learning materials

CM2: Essential.

Options, Futures, and Other Derivatives (10th Edition) by John C. Hull: Recommended for those who want to pre-read as this was easier to understand than the notes. Not essential by any means, however.

Assessments

Assessment name	Weighting
Test	10%
Assignment	25%
Final Exam	65%

The group assignment required students to read ahead in CM2 which made things a bit tougher. This was harder this time round as some chapters were particularly difficult.

Learning activities

Lecture (2 hours)

Lectures were very teachable, which became very useful as the CM2 notes become virtually incomprehensible at times. The lecturer again had handwritten notes and again these were slightly

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Unit Guides
STAT3010 Financial Engineering 2

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unorganised at times as a topic could be spread across various PDF's (among some from the previous syllabus which aren't used at all).

Tutorial (1 hour)

These were identical in style to STAT3006 Financial Engingeering 1. Tutorials consisted of past paper questions, only a handful of which to be done. Most were done in excel, though some (towards the start and end of the semester) were pen and paper proof type questions which were useful for understanding but not so much for assessments. That said, some assessable content, notably The Greeks, featured in a tutorial rather than workshop. Towards the end of the semester the UC and students debated altering tutorials to resemble the workshops which were very much exam style.

Workshops (1 hour)

These were very much in the style of the exam and once again mirrored STAT3006 Financial Engingeering 1. These were mainly Excel case studies which student's will be very accustomed to by now. Debate is strongly encouraged.

One of the first workshops was a massive 200 MB+ spreadsheet which hilariously crippled most students' laptops. Simulation does feature several times throughout the unit, although just a handful of sample paths, rather than 10,000 as in that workshop.

Links to other units
Previous units
Knowledge
Overlap

Students who take the optional INVE3000 Introduction to Derivative Securities see significant overlap with this unit. It is however done in a far less mathematically rigorous way but does spend more time on topics which are covered very quickly in this unit. As content in that unit is not very difficult, it became very beneficial for students to work a bit in advance to get used to the concept of an option before digging into the weeds of trying to price it in this unit.

Future units
Stochastic Differential concepts are again used in STAT3008 Provisioning Techniques

General comments
It's anticipated that a new lecturer might be taking this unit from 2023 onwards, and so commentary is expected to change significantly.

This unit is far and away more difficult than its predecessor, STAT3006 Financial Engingeering 1. This is arguably the most conceptually difficult unit in the entire course, though it is by no means impossible.

Stochastic Calculus is among the most difficult topics and features right at the start of the semester. This is exacerbated by most students not understanding the concepts underpinning standard differential equations in the first place and the notes reading like they were written by a mathematics professor trying to flex on students. Conceptual difficulty dies down for a while but shoots right back up with the five-step method towards the end of the semester.   There is a saving grace that compensates for the difficulty: Content is immensely interesting and so this actually becomes many students' favourite unit this semester.

With the amount of times it features in content and notably the exam, this unit might as well be called Introduction to Replicating Portfolios. The importance of this concept cannot be overstated.

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Unit Guides
STAT3000 Statistical Inference

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STAT3000 Statistical Inference

Challenge rating	Exemption
2	None

Stream	Availability
Actuarial and Applied Statistics Major	Semester 1 only

Prerequisites for this unit…	This unit is a prerequisite for…
STAT2001 Mathematical Statistics	

Syllabus

- » Parameter estimation
  - ↳ Method of moments and quartiles
  - ↳ Maximum likelihood
  - ↳ Fisher information
  - ↳ Bayesian approach
  - ↳ Efficiency and sufficiency of estimates
  - ↳ Cramer-Rao inequality
- » Hypothesis testing
  - ↳ The Neyman-Pearson Lemma
  - ↳ Summarising data
  - ↳ Goodness of fit
- » Multivariate statistics
  - ↳ Random vectors
  - ↳ Multivariate distributions
  - ↳ Time series
  - ↳ Non-parametric estimation

Learning materials

There are a few "recommended" texts in the unit outline for this unit but they are certainly not required to perform well in this unit. Should you be interested in gaining some more information about some of the topics, they are available to borrow from the library.

Assessments

Assessment name	Weighting
In-class Test	30%
In-class quizzes	5%
Online Quizzes	15%
Final Exam	50%

Learning activities

Lecture (2 hours)

Lectures were explained using a slideshow and occasional additions made on the whiteboard. The slides contained the same content as the lecture notes which were uploaded.

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Unit Guides
STAT3000 Statistical Inference

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Tutorial (1 hour) and Workshop (1 hour)

The workshops and tutorial sessions were combined together for a two-hour period. A worksheet was given out at the beginning of the lesson and students could independently complete the questions or work along other students to collaboratively complete the worksheet.

The lecturer would only interfere if students required assistance. Solutions for the worksheet were usually uploaded on the same night of the tutorial. The quiz marks and solutions, if applicable, were given at the beginning of this session.

Links to other units

Previous units

This Unit draw significantly upon knowledge from STAT2001 Mathematical Statistics
This unit has significant overlap with STAT3001 (Statistical Modelling).

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Unit Guides
STAT2003 Analytics for Experimental and Simulated Data

Contribute

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STAT2003 Analytics for Experimental and Simulated Data

Challenge rating	Exemption
?	None

Stream	Availability
Actuarial and Applied Statistics Major	Semester 1 only

Prerequisites for this unit…	This unit is a prerequisite for…
STAT1006 Regression and Nonparametric Inference	

Syllabus

- » Multivariate statistics
  - ↳ Random sampling
  - ↳ Mean vectors
  - ↳ Correlation and covariance matrices
  - ↳ Generalised variances
  - ↳ Multivariate normal distributions
- » Multivariate statistical analysis techniques
  - ‼ Principle components analysis (PCA)
  - ‼ Discriminant analysis
  - ‼ Clustering techniques
- » Machine learning methods

Learning materials

Assessments

Assessment name	Weighting
Computer-based test 1	20%
Computer-based test 1	30%
Project	50%

Learning activities

Lecture (2 hours)

Tutorial (1 hour)

Computer Lab (2 hour)

General comments

We are yet to receive feedback for this unit. If you have taken this unit, please consider contributing.

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Unit Guides
STAT3009 Risk Analysis

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Semester 2

STAT3009 Risk Analysis	
Challenge rating	**Exemption**
?	CS2
Stream	**Availability**
Actuarial Science Major	Semester 2 only
Prerequisites for this unit…	**This unit is a prerequisite for…**

This is the first run of this unit, therefore no feedback has been gathered.

Syllabus

- » Bayesian statistics in credibility theory
- » Loss distributions
  - ↳ Compound distributions
  - ↳ Risk modelling
- » Copulas (account for tail dependencies in distributions)

Learning materials

CS2: Highly recommended.

Links to other units

Previous units

Bayesian statistics covered in STAT3001 will helpful for the Bayesian aspects of this unit.

The plethora of probability distributions covered in STAT2001 and STAT3001 will be used again for loss distributions.

Although this is a new topic, it is anticipated that previous knowledge of joint distributions from STAT2001 will be useful for the study of copulas. Incidentally, copulas is expected to be quite a challenging topic conceptually, so refreshing your knowledge of joint distributions could prove useful.

Future units

Copulas are discussed conceptually at times in honours units such as ACTL4000, ACTL4001 and ACLT4002.

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Unit Guides
MATH3010 Contingencies 2

Contribute

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MATH3010 Contingencies 2

Challenge rating	Exemption
?	CM1

Stream	Availability
Actuarial Science Major	Semester 2 only

Prerequisites for this unit…	This unit is a prerequisite for…
MATH3009 Contingencies 1	

This is the first run of this unit, therefore no feedback has been gathered.

Syllabus

This unit covers the pricing and valuation (reserving) of financial contracts involving multi-decrements and multiple lives. Practical knowledge is presented alongside mathematical techniques relevant to actuarial practice in life and health insurance and superannuation (pensions). The principles of cashflow modelling are discussed including such topics as choice of model, deterministic and stochastic models and use of scenario and sensitivity testing. Practical, hands-on modelling experience is developed through the use of Excel spreadsheets (students are assumed to have basic Excel skills prior to commencement of this unit)

Learning materials

CM1: Highly recommended

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Unit Guides

STAT2004 Analytics for Observational Data

Contribute

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STAT2004 Analytics for Observational Data

Challenge rating	Exemption
?	None

Stream	Availability
Actuarial Science Major and Actuarial and Applied Statistics Major	Semester 2 only

Prerequisites for this unit…	This unit is a prerequisite for…
STAT2001 Mathematical Statistics	

This is the first run of this unit, therefore no feedback has been gathered.

Syllabus

- » Multivariate statistics
  - ↳ Random sampling
  - ↳ Mean vectors
  - ↳ Correlation and covariance matrices
  - ↳ Generalised variances
  - ↳ Multivariate normal distributions
- » Multivariate statistical analysis techniques
  - ↳ Principle components analysis (PCA)
  - ↳ Discriminant analysis
  - ↳ Clustering techniques
- » Machine learning methods

Assessments

Assessment name	Weighting
Computer-based test 1	20%
Computer-based test 1	30%
Project	50%

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Unit Guides
STAT3008 Provisioning Techniques

Contribute

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STAT3008 Provisioning Techniques

Challenge rating	Exemption
?	CM2

Stream	Availability
Actuarial Science Major	Semester 2 only

Prerequisites for this unit…	This unit is a prerequisite for…
STAT3010 Financial Engineering 2	

This is the first run of this unit, therefore no feedback has been gathered.

Syllabus

- » Loss distributions
- » Risk models
- » Credibility theory
- » Ruin theory
- » Run-off triangles
- » Projecting Ultimate position

Learning materials

CM2: Highly recommended

Honours

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Unit Guides
ACTL4000 Actuarial Control Cycle 1

Contribute

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Semester 1

ACTL4000 Actuarial Control Cycle 1

Challenge rating	Exemption
5	Actuarial Control Cycle

Type of unit	Availability
PT 2	Semester 1 only

Prerequisites for this unit…	This unit is a prerequisite for…
Nil	ACTL4004

Syllabus

» Overview of the control cycle
» Context of actuarial work
» Risk management frameworks
» Applying risk management
» Need for financial products
» Product Design
» Need for capital
» Modelling
» Data and assumptions
» Pricing

Learning materials

[Understanding Actuarial Management](#) **by Bellis, Lyon, Klugman and Shepherd:** Essential

Note that the textbook might change with the new curriculum, but this is unlikely due to the lack of change specifically in the control cycle subject.

If you don't wish to purchase the textbook, some copies are available from the Curtin library. It could be a good idea to get it out and have a look through it before you start the semester. Perhaps ask someone in a lower year to borrow it for you if you no longer can because you are between degrees.

Assessments

Assessment name	Weighting
Written Report	15%
Presentation	15%
Class Discussion	10%
Exam	60%

The presentation assessment involved performing some data analysis on health insurance products in Excel for an external person from industry.

The exam was quite challenging.

Learning activities

Lecture (2 hours)

The lecture slides were a useful, condensed version of the textbook with some added information and clarification. It was advisable to look at the lecture slides first when preparing for the exam as they contained the main things we needed to know.

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Unit Guides
ACTL4000 Actuarial Control Cycle 1

Contribute

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During lectures the lecturer would partially present material with notes on the board and partially conduct a discussion on the material. It was expected that students pre-read chapters of the textbook. This pre-reading was vital to being included as part of the discussion.

Tutorial (1 hour) and Workshop (1 hour)

The tutorial and workshop questions were quality exam-style questions that assisted us with knowing what to expect in the exam.

The tutorial and workshops were run back-to-back and comprised of students working together (with one person on the whiteboard) to answer some prescribed questions. They were typically exam-style questions and students were encouraged to tackle them using a "framework" learnt in lectures and pre-reading. The lecturer would intervene when students were stuck and provided feedback where appropriate but this learning activity was student-lead.

Students were expected to have a look at the questions and give them a go beforehand.

General comments

This unit (and part II in general) provides the 'critical thinking' aspect of an actuary that you don't see in the technical actuarial subjects. This unit is all about the business world and putting your knowledge into practice.
The presentation assessment for this to an individual from industry who actually used our research. This was based on particular convenience at that time but it may well happen again.

Pre-reading was quite important in this unit. It was at times challenging to keep up with amongst all one's other obligations (either work or honours) but nevertheless vital for getting the most out of class.
Participation in class was assessed and prereading naturally assisted with this.
This is typically the first associateship-level course taken by students. It can be something of a shock that it is a written-response style unit as opposed the mathematics-heavy units actuarial students will be accustomed to. With that being said, it is not an essay-based unit, indeed most of the questions are short answer with bullet points and diagrams often being appropriate answers to questions. The ability to write concise and coherent answers with little "fluff" is valued in this unit.
This unit covered a large amount of information, much of which needed to be wrote-learned for the exam. Employing memorisation strategies is advisable. Application-style questions were covered in the exam which required a strong understanding of the content to perform well in.

Links to other units

Previous units

Knowledge from previous CT units taken is assumed in this unit. Although it is fairly self-contained.

Knowledge of economics from any previous units such as ECON1000, ECON1001 and ECON2001 is particularly useful.

Understanding of the actuarial profession from ACTL1001 and ACTL1000 is helpful.

Future units

ACTL4001 Actuarial Control Cycle 2 follows on from this unit but covers topics that are fairly independent.

ACTL4002 makes use of risk management frameworks covered in this unit.

The new unit, ACTL4004 is meant to expand on risk management and product design taught in this unit.

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Unit Guides
ACTL4003 Predictive Analytics Principles

Contribute

Table of Contents

ACTL4003 Predictive Analytics Principles

Challenge rating	Exemption
5	Data Analytics Principles

Type of unit	Availability
	Semester 1 only

Prerequisites for this unit…	This unit is a prerequisite for…
Nil	ACTL4004

This is the first run of this unit, therefore no feedback has been gathered.

Syllabus

- » Data analytics and the business environment
- » Data understanding and preparation
- » Modelling
  - ↳ Nomenclature
  - ↳ Feature selection and treatment
  - ↳ Implementation and comparison of various modelling techniques GLM, shrinkage methods, tree-based methods and neural networks
  - ↳ Validation techniques
- » Evaluation of model appropriateness and performance
- » Communication

Links to other units

Previous units

Any knowledge of R from previous knowledge will be useful for this unit.

A significant portion of this unit focusses on modelling, so STAT3001 knowledge will inevitably be useful.

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Unit Guides
ACTL4001 Actuarial Control Cycle 2

Contribute

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Semester 2

ACTL4001 Actuarial Control Cycle 2	
Challenge rating	**Exemption**
5	Actuarial Control Cycle from the Actuary Program
Type of unit	**Availability**
	Semester 2 only
Prerequisites for this unit…	**This unit is a prerequisite for…**
Nil	

Syllabus

- » Professionalism
- » Regulation
- » Valuing Liabilities
- » Assets
- » Solvency
  - ↳ Capital requirements
  - ↳ Risk management
- » Profit
- » Monitoring experience
- » Responding to experience

Learning materials

[Understanding Actuarial Management](#) **by Bellis, Lyon, Klugman and Shepherd:** Essential

Note that the textbook might change with the new curriculum but this is unlikely due to the lack of change specifically in the Control Cycle subject in the 2020 changes from the Actuaries Institute.

The textbook was essential for this unit. All pre-readings came from the textbook and "bookwork" questions in the exam were based on material from the textbook.

If you don't wish to purchase the textbook, some copies are available from the Curtin library. It could be a good idea to get it out and have a look through it before you start the semester. Perhaps ask someone in a lower year to borrow it for you if you no longer can because you are between degrees.

Assessments

Assessment name	Weighting
Class discussion	10%
Group Presentation	15%
Report	15%
Exam	60%

The class discussion was based on contribution to the discussion in all classes as well as the weekly "newsbite". Each member of the class was assigned a week to talk about a recent news article, relevant to the topic covered (e.g. assets) that week and link it back to weekly reading from the textbook. Other members of the class would then engage in a discussion. To obtain a high mark in the class discussion you should conduct yourself with confidence (being well-prepared helps with this) and try to bring others into the discussion (strike a balance between talking and listening).

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Unit Guides
ACTL4001 Actuarial Control Cycle 2

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In the group presentation, the 6-person class was split into three. It involved a modelling and reporting task of insurance liabilities and profit that was completed in Excel. Results were then presented in a mock board meeting.

In 2019, the report involved performing research on technology in finance. Note that the formatting and general layout of the report was scrutinised closely by the lecturer. It was important to make it look professional.

The lecturer was very helpful with providing assistance and intermediate feedback on assessments. Don't be afraid to ask.

The exam for this unit was extremely challenging. Obtaining good grades in the other assessments to create a buffer is important.

Learning activities

Lecture (2 hours)

Lectures were similar to ACTL4000 in the sense that they involved a significant amount of class discussion.

As class discussion was a part of assessment, it was important to contribute your point of view and to be well prepared for classes.

Tutorial (1 hour) and Workshop (1 hour)

The tutorial and workshop ran back-to-back and the lines were blurred between them. Both involved attempting questions, sometimes in the as a class on the board, sometimes in smaller groups, sometimes in Excel. These tasks often involved a discussion of some reading material, often related to current events that tied in well with that week's topic.

General comments

This unit had more calculations in it than ACTL4000 but was equally as, if not more, challenging. It still involved a fair amount of rote learning and written application questions.

Margin on services liabilities were a source of confusion for many students and was fairly prominent in assessment (in both the presentation and the exam).

Links to other units

Previous units

It more the approach taken rather than the topics covered that are useful in this unit compared to ACTL4000.

Overlap

Topics on assets including investments and asset liability management are covered briefly in this unit while being taught in more detail in ACTL4002.

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Unit Guides
ACTL4002 Actuarial Asset Liability Management

Contribute

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ACTL4002 Actuarial Asset Liability Management

Challenge rating	Exemption
4.5	None, though content assists Institute PT 2 ALM

Type of unit	Availability
	Semester 2 only

Prerequisites for this unit…	This unit is a prerequisite for…
STAT3006	

Syllabus

Note that these may change in the new curriculum.

- » The economic balance sheet
- » Money market instruments, fixed interest securities
- » Property; equities
- » Overseas investments; derivatives; collective investment schemes
- » Economic influences; financial economics topics
- » Required return vs expected return; accounting bases
- » Discounted cashflow models
- » Comparing returns from asset classes
- » The 'matching' principle
- » Investment risk
- » Asset liability management

Learning materials

"**Investment Principles for Actuaries**" **by Fitzherbert**

"**Financial institutions, instruments & markets**" **by Viney**

"**Money & Capital Markets Pricing, Yields and Analysis**" **by Sherris**

These textbooks were essential as weekly readings came out of these textbooks. At an honours level you are expected to do reading prior to attending each lecture as lectures involve far more discussion.

It did not matter which edition you had of Viney or Sherris, although having a more recent version is ideal. The only difference it makes is contextual information such as in versions of Viney that were released after 2010 reference the global financial crisis in examples.

The lecture slides, combined with supplementary information discussed during lectures, was sufficient for learning "bookwork" but additional context and explanations would be found in the three textbook.

Fitzherbert was the main textbook for this unit. It was more difficult to understand than the others (the lecturer also pointed this out). Fitzherbert made some interesting points at times but it was generally less useful than the other two.

Viney was a textbook that was favoured by the lecturer. It was quite easy to read and covered most of the topics that were covered in class. It was more of a general finance textbook that specifically for actuarial purposes so the maths in it was not very rigorous.

Sherris was used for only a small number of topics in this unit but did a good job of covering those that it did. Notation used in it was similar to actuarial notation which made things a little more consistent and familiar.

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Unit Guides
ACTL4002 Actuarial Asset Liability Management

Contribute

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Assessments

Assessment name	Weighting
Group assignment	15%
Test	15%
Exam	70%

Performance in the test is strong indication of what the level to expect as well as how you will perform in the exam. You needed to know bookwork well in both and as the test was fairly late on in the semester, study for the test actually assisted with study for the exam. Both were what the lecturer called "exam standard".

The assignment was completed such that the entire class (of 6 people) was one group. The task was to research a particular technical modelling approach to forecast the financial position of company in order to determine capital requirements. This involved the use of both R and Excel.

Learning activities

Lectures, workshops and tutorials ran back-to-back…to-back in a 4-hour block. The order of them was sometimes switched but they were always distinctly different.

Lecture (2 hours)

In lectures, the lecturer presented material with a slideshow with a large amount of explanation. Discussion of the material was often prompted and encouraged (having a small class allowed this to happen quite easily).

Tutorial (1 hour)

In tutorials questions were completed as a group with one person writing on the board. It was expected that students had attempted the questions before the tutorial but further discussion of appropriate answers was had during the tutorial. The lecturer would assist if the everyone was struggling but generally let students come up with their own solution.

Attempting the questions beforehand was sometimes quite difficult as the tutorial was on the same day as the lecture and covered the same topic as the lecture.

Workshop (1 hour)

For the first half of semester, the workshop was time to work on the assignment with the lecturer there to help if needed. In the second half of semester, additional application questions were completed in a similar way to the tutorial.

General comments

This unit provides students with a new-found appreciation for a number of topics covered previous units in the first three years. The term structure of interest rates in particular is one that springs to mind. The key to this is providing context of how it all works in the real world and how various aspects of finance interact with each other.

It could be seen as a refreshing change from the far too frequent occurrence of units that provide and incoherent and dispassionate lists of seemingly unrelated topics (in spite of the fact that they really are related). This unit actually provides you with knowledge and critical thinking ability that you might apply in the real world and link concepts together in your mind.

Links to other units

Previous units

Some assets and asset liability management is covered at a basic level at the same time in ACTL4001.

Overlap

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Unit Guides
ACTL4002 Actuarial Asset Liability Management

Contribute

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There is an "assets" topic in ACTL4001 which is commonly taken at the same time as this unit. Some of the content is similar although a slightly different perspective is taken in each.

Future units

This unit will assist students with taking the Asset Liability Management course facilitated by the Actuaries.

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Unit Guides
ACTL4004 Actuarial Risk Management

Contribute

Table of Contents

ACTL4004 Actuarial Risk Management

Challenge rating	Exemption
5	None, though content assists Institute PT 2 ALM

Type of unit	Availability
	Semester 2 only

Prerequisites for this unit…	This unit is a prerequisite for…

This is the first run of this unit, therefore no feedback has been gathered.

Syllabus

- » Deeper approach to managing risks in an organisation
- » Risks in product design
- » Risks in liabilities
- » Modelling risks

Links to other units

Previous units

This unit is meant to build upon knowledge of risk developed in ACTL4000

Overlap

The discussion of risk is embedded within ACTL4001 and ACTL4002. This unit will thus complement the other two with its deeper focus on risk.

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Optional and Elective Units

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Unit Guides
COMP1002 Data Structures and Algorithms

Contribute

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1000 Units

COMP1002 Data Structures and Algorithms

Unit nickname		Previous unit name	
DSA		N/A	

Challenge rating	Type of unit		Exemption
3	Optional unit (although it is not on the list it has been negotiated by actuarial students in the past)		N/A

Information based on		Availability	
Semester2 021		Both Semesters	

Prerequisites for this unit…		This unit is a prerequisite for…	
Nil		Nil	

Reliability of information			

We suggest you check the published unit outlines for more information.

Syllabus/ Topics

- » Sorting
- » stacks, queues and recursion
- » linked lists and iterators
- » binary search trees and some advanced trees
- » graphs and search methods
- » heaps
- » hash tables

Assessments

Assessment name	Weighting
Practicals	20%
Assignment	30%
Final Examination	50%

There is a significant disparity between how easy the theory of this unit is and the time required for the coding aspects, such as the weekly practicals and the assignment. The theory is comparatively easy and makes up the majority of the written assessments. The practicals can be very time consuming with some students taking up to 8+ hours of coding time for the more complex practicals.

Learning activities

Lecture (2 hours)

The lectures are run in a language neutral setting with examples given in pseudocode. Lectures were a thorough exploration of the associated theory, complete with detailed slides that include pseudo-code and code for both languages.

Computer Lab (1 hour)

Weekly practicals and associated UML diagrams were marked by tutors according to a known marking key at the start of each lab. They had a far more practical focus and tutors were often available to help investigate problems with code or guide your approach on your future practicals.

iLectures Quality

Learning activities recorded: lecture

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Unit Guides
COMP1002 Data Structures and Algorithms

Contribute

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Teaching style lent itself to being recorded: Yes

The iLectures often had issues with camera movement and any diagrams the lecturer drew on the whiteboard. However, the theory could easily be understood through the detailed slides, the lecturer's clear descriptions and extensive online information.

Learning materials

Textbook

Snippets from certain texts focusing on the theory are provided via Blackboard. Otherwise most textbooks are created for Java students and are not applicable to Python students or required at all in anyway.

List of other learning materials

- » slides including pseudo-code and code
- » weekly practical worksheets
- » notes, such as UML style guide

Usefulness of learning materials

The UML style guide is absolutely essential to completely the weekly practical UML diagrams and tutors often consult it when marking if unsure.
The notes and other material made available on Blackboard specifically for Python students can definitely be useful, although more practical questions about specific code are often answered online through resources such as StackOverflow.

General comments

This unit is not recommended to anyone who is not confident in their programming ability as it is primarily core, first year Computer Science unit. The first few weeks are particularly challenging as the majority of the cohort have completed Object Oriented Program Design (COMP1001 or OOPD) which delves more deeply into Object Orientation and UML diagrams. However, it is one of the most rewarding elective units and in combination with COMP1005 is likely sufficient to be considered intermediate in Python.

Industry knowledge

Computer languages and software

Languages: Python or Java

This unit will help to compound a base level familiarity with Python, including providing extensive practice thinking about how Object Orientation can be applied to various algorithms. It has limited practical advice, however, and does not directly cover packages or algorithms which are likely to be used in basic data analytics using Python.

Industry practice

None.

Links to other units

Useful knowledge from previous units

Object orientation and NumPy are more advanced concepts from COMP1005 which are absolutely essential.

Overlap with other units commonly taken concurrently

N/A

Useful topics for future units

N/A

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Unit Guides
COMP1005 Fundamentals of Programming

Contribute

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COMP1005 Fundamentals of Programming

Unit nickname	Previous unit name
FOP	N/A

Challenge rating	Type of unit	Exemption
1	Optional Unit	N/A

Information based on	Availability
Semester 1 2019	Both Semesters
(edited from Semester 1 2018)	

Prerequisites for this unit…	This unit is a prerequisite for…
Nil	COMP1002

Reliability of information

We suggest you check the published unit outlines for more information.

Syllabus/ Topics

- » Strings and lists
- » Arrays and plotting
- » Multi-dimensional arrays
- » Files and grids
- » Scripts and automation
- » Data wrangling
- » Working with structured data
- » Modelling with objects
- » Objects and exceptions
- » Projects in Python

Assessments

Assessment name	Weighting
Worksheet Test	15%
Practical Test	15%
Assignment	20%
Final Examination	50%

The assignment in this unit required a reasonable amount of work to complete. The questions in the exam were quite similar to past exams. Note however that answers to practice exams were not provided.

Learning activities

Lecture (2 hours)

The lecturer read theory and extensive examples from the lecture slides. There was minimal class participation. Lecture examples were almost always useful in lab exercises.

Computer Laboratory (2 hours)

Weekly lab tutorials consisting of coding questions like the lecture examples. Copy pasting the code from lecture slides would answer most of the questions. Assessments worth a few percent of the course were held every few weeks. They were not under test conditions and students were able to ask for help.

iLectures Quality

Learning activities recorded: lecture

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Unit Guides
COMP1005 Fundamentals of Programming

Contribute

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Teaching style lent itself to being recorded: yes

iLecture quality is reasonably clear, and in conjunction with provided slides can be used to understand the content.

Learning materials

Textbook

No textbook was prescribed for this unit.

Usefulness of learning materials

- » Lecture slides
- » Practical exercises

General comments

This unit should cause actuarial students absolutely no trouble. It is run as a fundamentals course so there is no prior knowledge required. Students were required to submit the tutorials weekly and it is recommended to attend each tutorial to complete this with tutors help. Note that Curtin's computers or a computer with Linux were the easiest way to work in this unit.

Industry knowledge

Computer languages and software

Languages: Python

Software: Linux operating system

Industry practice

Python knowledge may prove useful in industry. The content covered in this unit, however, is quite basic and further units or projects involving the language would need to be undertaken to use this on a professional level.

Links to other units

Useful knowledge from previous units

N/A

Overlap with other units commonly taken concurrently

N/A

Useful topics for future units

Knowledge of python from this unit is important in COMP1002 (unless you know Java).

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Unit Guides
STAT1003 Introduction to Data Science

Contribute

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STAT1003 Introduction to Data Science

Unit nickname		Previous unit name
Data science		N/A

Challenge rating	Type of unit	Exemption
2	Optional unit	N/A

Information based on	Availability
Semester 1 2018	Semester 1 only

Prerequisites for this unit…	This unit is a prerequisite for…
Nil	Nil

Reliability of information

The lecturer for this unit is likely to change in the next offering.

We suggest you check the published unit outlines for more information.

Syllabus/ Topics

- » Introduction to data science
- » Sources of data; getting and cleaning data
- » Visualisation:
    - ↳ Exploring data
    - ↳ Elements of visualization
    - ↳ Good/bad graphics
    - ↳ Grammar of graphics
    - ↳ Taxonomy for data graphics
    - ↳ Dissecting graphics
- » Big Data and Ethics
- » Data analysis:
    - ↳ Statistical foundations
    - ↳ Experimental and observational studies
    - ↳ Predictive and explanatory models
    - ↳ Simple linear regression
    - ↳ Multiple linear regression
    - ↳ Assessing predictive ability
    - ↳ Model diagnostics
    - ↳ Classification or prediction?
    - ↳ Methods for classification
    - ↳ Logistic regression
    - ↳ Methods of classification
- » Communication of data
- » Managing Data

Assessments

Assessment name	Weighting
Test 1	30%
Test 2	30%
Group assignment	40%

The group project consisted of a report and presentation on topic chosen by the group.

Learning activities

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Unit Guides
STAT1003 Introduction to Data Science

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Lecture (1 hours)

The theory behind specific coding methods on r-studio was discussed. The lecture aided students in explaining the rationale behind certain coding and modelling techniques.

There was no exam, so the theoretical aspect of the unit is more for the student's understanding than for assessment purposes.

Computer Lab (1 hour)

As all assessments for this unit were based on R-studio. This made the computer lab very important. Attendance is highly recommended.

The solutions were uploaded every week and the lecturer explained the code. Alternative ways of achieving the same output was also often discussed.

The two hour length allowed students ample time to get through all the exercises and ask questions.

Workshop (1 hour)

Every week guest speaker in the field would come to talk about the work they do. It was interesting, depending on the speaker but wasn't assessed in any way.

Note that this has since been changed and a reflection on the speakers is now a part of the group assignment assessment as of 2019.

iLectures Quality

Learning activities recorded: lecture, workshop (only some, when the speaker consented)

Teaching style lent itself to being recorded: yes

The iLectures were of good quality, the lecturer displayed everything in the slides and spoke into the microphone.

The guest speakers would sometimes ask for the ilecture to be turned off so not all of the "workshops" were available to view online.

Learning materials

Textbook

No textbook was prescribed for this unit.

List of other learning materials
- » Lecture notes (pdf)
- » Worksheets (rmd/ html)
- » Worksheet solutions (rmd/ html)
- » Pre-reading links (online web-address)

Usefulness of learning materials

The lecture notes and R worksheets were more than satisfactory for this unit.

General comments

The lecturer prepares you for the tests. Students are provided with previous tests to practice.

The lecturer also often threw in bonus questions, which made it easier to score well. Those who do STAT1000 (or now STAT1006) prior to taking this unit are likely to find this unit comparatively easier.

Industry knowledge

Computer languages and software

Languages: R

Software: RStudio

Programming language R is covered in depth.

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Unit Guides
STAT1003 Introduction to Data Science

Contribute

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Industry practice

This unit gives a broader view on data and the extent to which it is present in industry.

Links to other units

Useful knowledge from previous units

R was covered in a similar way in the first-year unit STAT1000 (Regression and Non-Parametric Inference).

Overlap with other units commonly taken concurrently

N/A

Useful topics for future units

Knowledge of R is useful in any units that use it in future such as STAT3001 and MATH3005.

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Unit Guides
MATH2009 Calculus 2

Contribute

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2000 Units

MATH2009 Calculus 2	
Unit nickname	**Previous unit name**
Calc 2	Advanced Calculus
Challenge rating	**Type of unit**

Challenge rating	**Type of unit**	**Exemption**
3	Optional	N/A
Information based on		**Availability**
Semester 1 2021		Semester 1 only

Prerequisites for this unit…	**This unit is a prerequisite for…**
MATH1016 Calculus 1 or MATH1018 Advanced Mathematics 2	

Reliability of information
We suggest you check the published unit outlines for more information.

Syllabus/ Topics

- » Max and minimums, Lagrangians
- » Double integrals
- » Triple integrals
- » Line integrals
- » Surface integrals
- » Divergence and stokes theorem
- » First order homogeneous differential equations (DE)
- » Second and higher order homogeneous DE
- » Non-homogeneous second order DE
- » Series solutions
- » Fourier series
- » Partial differential equations

Assessments

Assessment name	Weighting
Assignment 1	15%
Assignment 2	15%
Assignment 3	20%
Final Examination	50%

Learning activities

Lecture (2 hours)

Lectures were very long, tedious and focused mostly on derivation at the start. Later content became so endless that it was merely explained how things are to be done and students were directed to proofs if they wished to view them. These were worth attending, though the math in this unit is very much practical, so these proofs could largely be ignored. The lecturer's accent was hard to understand for many

Tutorial (1 hour)

Students were provided with page of exam style questions which they can work through independently or with the lecturer. Students were asked to volunteer to solve each equation on the whiteboard after each question.Solutions were provided in this class and online. The lecturer's accent was hard to understand for many

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Unit Guides
MATH2009 Calculus 2

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Workshop (1 hour)

The workshops consisted of the lecturer doing a few additional questions. These were worth attending as this was a unit where you benefited from seeing questions done from start to finish and learning the process. The lecturer's accent was hard to understand for many

iLectures Quality

Learning activities recorded: Lecture

Teaching style lent itself to being recorded: Yes

In fact, everything was recorded, though tutorials were in person.

Learning materials

Textbook

Textbook importance: Unimportant

This was useful for those who cared about the rigorous derivation that was skipped during later lectures, though most students ignored it.

List of other learning materials
  » Lecture Slides (PowerPoint)
  » Worksheet exercise with separate solutions (pdf)

Usefulness of learning materials

The lecture slides were more than sufficient for learning the content. Tutorial questions proved to be of tremendous help, even more so than the lectures, though the lectures were essential to learn how to do things.

General comments

Looking back, this unit was not so bad as it prepared students well for the true actuarial load. The following reflects the in the moment thoughts.

The lecturer's accent was hard to understand for many.

This unit is a nightmare for those who cannot accept things at face value. The sheer amount of content means that proofs were later either omitted (though students received resources to research on their own) or were just so numerous and involving that you couldn't get through them whilst adjusting to the second-year load.

This is perhaps the most intellectually difficult unit of second year, particularly series solutions to differential equations. That said, the difficulty rating is pushed down significantly as there are no surprises in this unit. Learn how to do a particular equation, practice those methods on tutorials and the supplied past papers and you would have seen everything the exam could present.

To be fair, doing the math, particularly in the first half, is a lot of fun for those who enjoy calculus. Students should just have the mindset of learning how to do things before trying to comprehend them, particularly as this unit is designed for physics students and so there aren't many actuarial applications.

Industry knowledge

Links to other units

Useful knowledge from previous units

This unit carries on from MATH1016 Calculus 1/MATH1018 Advanced Mathematics 2

Useful topics for future units

Lagrange multipliers are used in various units, including STAT3006 Financial Engingeering1, though a full comprehension is unnecessary.

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Unit Guides
INDE2000 Supply Chain Modelling and Optimisation

Contribute

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INDE2000 Supply Chain Modelling and Optimisation

Unit nickname	Previous unit name
Supply/SC	N/A

Challenge rating	Type of unit	Exemption
2	Optional	N/A

Information based on	Availability
Semester 1 2018	Semester 1 only

Prerequisites for this unit…	This unit is a prerequisite for…
Nil	INDE2001 Logistics Modelling and Optimisation

Reliability of information

We suggest you check the published unit outlines for more information.

Syllabus/ Topics

- » Concepts, Roles, Significance of logistics/Supply Chain Management
- » Supply Chain Optimization
- » Modelling Supply Chain/Logistics Networks
- » Inventory Management System; Inventory Models – Single Commodity, Deterministic Demand
- » Inventory Management Models with Discounts
- » Multi Commodity EOQ Models
- » Stochastic Inventory models: Single period/Single commodity models
- » Stochastic Inventory models: Multi-period models with no shortage and with a shortage
- » Concepts, Roles and Significance of Forecasting
- » Methods for Demand Forecasting: Moving Average method; Time Series and Exponential Smoothing Method
- » Demand Forecasting with Seasonal Variation: Winter's Method; Forecasting's Accuracy
- » Adaptive Control Models of Demand Forecasting

Assessments

Assessment name	Weighting
Assignment 1	15%
Assignment 2	15%
Mid-Semester Test	20%
Final Examination	50%

The course included 2 assignments that were graded. Both assignments were relatively simple and if enough case was taken, students could use it to boost their course mark.

Make sure to go through past exams and midsemester tests as not all questions that show up in the final exam will be fully explained or shown in great detail during the lecture.

The lecturer was helpful when it came to answering any assessment-based questions. Most assignment questions could be found online but one needed to be careful because sometimes there were different ways of doing each question that would yield different answers. Supplementary mid semester tests were provided for those who were performing poorly in the unit.

Learning activities

Lecture (2 hours)

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Unit Guides

INDE2000 Supply Chain Modelling and Optimisation

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Lectures were tedious and the volume of content would be hard to wade through on your own, luckily the lecturer would tell us what the relevant pieces of information were.

Tutorial (1 hour)

Students were provided with page of exam style questions which they can work through independently or with the lecturer. Solutions were provided in this class and online.

This was probably the most useful of the classes, but everything was also provided on blackboard.

Workshop (1 hour)

It was called a workshop, but it was actually a computer lab. We would be provided with a guide on how to answer questions based on the weeks work using excel.

Students worked on the exercises independently without much teaching from the lecturer.

It was helpful to attend this class for the assignments which are both take home and require excel. If you struggle or have specific questions it can be useful but overall it was not crucial if you're happy to go through the work yourself. Attendance for this class was generally low.

While they were not relevant for the tests or exams, they were relevant for an assignment. They were also useful in using functions in excel and solving logistical problems. Would recommend attending these labs.

iLectures Quality

Learning activities recorded: Lecture

Teaching style lent itself to being recorded: somewhat

The iLecture quality was extremely poor in the semester this guide was written due to room booking issues.

Learning materials

Textbook

Textbook reference: Introduction to Computational Optimization Methods for Production Planning in a Supply Chain by Stephan Voß and David L. Woodruff

Textbook importance: useful

Most of the questions the lecturer used were taken out of the textbook so going through the textbook was quite useful. Most students found that the lecture slides were more than adequate however.

List of other learning materials
  » Lecture Slides (PowerPoint)
  » Worksheet exercise with separate solutions (Word)
  » Computer Lab Questions/Activities (Word)

Usefulness of learning materials

The lecture slides were sufficient for learning the content. Sometimes answers to exercises were wrong. The working out was also often not outlined in favour of just the final answer alone.

General comments

This unit is a prerequisite for Logistics Modelling and Optimisation which can be taken as an optional unit in the second semester of second year. Please note that in order to have an optional unit in second semester, Actuarial Economics must be selected as a first-year subject.

One might assume this was a theory-based unit and although there was a lot of theory taught it was mainly numerical concepts that were assessed.

Overall, this unit is fine if you put in a couple hours every week to understand how to use the formulas and do practice questions.

It helps to bud with someone through the unit, there were a number of incorrect solutions given.

Industry knowledge

Computer languages and software

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INDE2000 Supply Chain Modelling and Optimisation

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Software: Excel

Excel was used during the computer labs and some assessments

Industry practice

Knowledge of supply chains and logistics can be useful in a business setting.

Links to other units

Useful knowledge from previous units

Lagrange multipliers from MATH2009 are used in this unit as well.

Overlap with other units commonly taken concurrently

N/A

Useful topics for future units

INDE2001 follows on from this unit.

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Unit Guides
INDE2001 Logistics Modelling and Optimisation

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INDE2001 Logistics Modelling and Optimisation

Unit nickname	Previous unit name
Logistics	N/A

Challenge rating	Type of unit	Exemption
?	Optional unit	N/A

Information based on	Availability
Yet to be reviewed	Semester 2 only

Prerequisites for this unit…	This unit is a prerequisite for…
Nil	Nil

Reliability of information

We are yet to receive a submission for this unit. If you have taken this unit recently, please help us out by contributing as directed in the link at the top right of the page.

We have provided as much information as we can find without input from those who took the unit.

We suggest you check the published unit outlines for more information.

Syllabus/ Topics

- » Modelling supply chain/ logistics networks
- » Warehouse logistics:
  - ↳ Structure and operations
  - ↳ Warehouse design
  - ↳ Product allocation
  - ↳ Operational issues
  - ↳ Optimisation algorithms
- » Facility location:
  - ↳ Optimal facility layout
  - ↳ Covering problems
  - ↳ P-centre problem
  - ↳ P-median problems

Assessments

Assessment name	Weighting
Assignment	24%
Test	26%
Examination	50%

Learning activities

Lecture (2 hours)

Tutorial (1 hour)

Workshop (1 hour)

Industry knowledge

Computer languages and software

None.

Links to other units

Useful knowledge from previous units

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Unit Guides
INDE2001 Logistics Modelling and Optimisation

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This unit follows on from its prerequisite unit, INDE2000.

Overlap with other units commonly taken concurrently

N/A

Useful topics for future units

N/A

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Unit Guides
MATH2000 Network Optimisation

Contribute

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MATH2000 Network Optimisation

Unit nickname	Previous unit name
Network	N/A

Challenge rating	Type of unit	Exemption
1.5	Elective Unit	N/A

Information based on	Availability
Semester 2 2018	Semester 2 only

Prerequisites for this unit…	This unit is a prerequisite for…
Nil	Nil

Reliability of information

We suggest you check the published unit outlines for more information.

Syllabus/ Topics

» Elementary graph theory and algorithms
» Graph factorisation
» Vertex and edge colourings
» Maximum flow problem
» Matching in graphs
» Network routing
» Network connectivity
» Project management

Assessments

Assessment name	Weighting
Assignment	20%
Test	30%
Examination	50%

Learning activities

Lecture (2 hours)

The lecturer went through lecture slides (provided) and worked examples (solutions only available if you watch the ilecture).

Tutorial (1 hour)

In tutorials, students attempted questions on whiteboards.

Workshop (1 hour)

Workshops were a continuation of the lecture and were recorded. Attendance for these classes was usually very low however the quality of the ilecture for these classes was poor so if examples were discussed on a white board these could not be interpreted from the ilecture. These examples were not key to understanding content and didn't affect any understanding.

iLectures Quality

Learning activities recorded: Lecture, workshop

Teaching style lent itself to being recorded: Yes

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Unit Guides
MATH2000 Network Optimisation

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For the lectures, the iLecture was of a high quality iLecture. Any examples were done on paper and all working out could be seen on the displays. The lecturer was clear and relatively easy to understand even on 2x speed. The workshop iLecture was of a lower quality. It was essentially just the lecture slides with commentary, any examples drawn on the whiteboards could not be interpreted, this may have been due to the venue.

Learning materials

Textbook

Textbook importance: essential

This textbook was written by a Curtin University lecturer and it was simply given to all students (no need to purchase it). It contained all of the relevant notes and questions for this unit. It also had some additional notes and questions that were not covered in this unit. Although some of the notes were fairly hard to understand, all relevant content was explained by the lecturer during the lectures.

List of other learning materials

- » Lecture Slides (ppt)
- » Textbook (PDF)
- » Solutions to exercises (PDF)

Usefulness of learning materials

No other resources are required for the unit, although students may want to research additional information for assignments.

General comments

This unit was a pretty straightforward and did not require strong mathematical ability. It consisted mainly of problem solving questions using basic maths and despite being given a lot of theory context, this it is not usually assessed. This unit could be seen as a CWA booster.

Industry knowledge

Computer languages and software

None.

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Unit Guides
MATH2010 Linear Algebra 2

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MATH2010 Linear Algebra 2

Unit nickname	Previous unit name
Linear	Linear Algebra (2016)

Challenge rating	Type of unit	Exemption
3	Optional unit	N/A

Information based on	Availability
Semester 2 2019	Semester 2 only
(Same as Semester 2 2017)	

Prerequisites for this unit…	This unit is a prerequisite for…
MATH1015 or MATH1017	INDE3000
MATH1016 or MATH1018	STAT3003 (no longer available)

Reliability of information

We suggest you check the published unit outlines for more information.

Syllabus/ Topics

- » Fields and vector spaces
- » Subspaces
- » Linear dependence and span
- » Bases and dimensions
- » Coordinates
- » Row and columns spaces
- » Affine varieties
- » Sum and intersection of subspaces
- » Linear transformations
- » Change of Coordinates
- » Orthogonal/ orthonormal bases, Orthogonal matrices and the Gram-Schmidt process
- » Inner products
- » Complex matrices and the Hermitian product
- » Least squares
- » Eigenvalues and eigenvectors
- » Cayley-Hamilton theorem
- » Diagonalisation of Matrices
- » Linear systems of differential equations
- » Jordan canonical form
- » Symmetric matrices
- » Spectral theorem
- » Quadratic forms
- » Singular value decomposition
- » Generalised inverses

Assessments

Assessment name	Weighting
Quizzes (3)	15%
Test	35%
Exam	50%

In all assessments, we were provided with more than enough time and arithmetical calculations were simple meaning this unit really focused on assessing your understanding of the content.

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Unit Guides
MATH2010 Linear Algebra 2

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Learning activities

Lecture (2 hours)

The lecturer went through lecture material, writing notes and examples on the whiteboard. The material was explained with a high degree of clarity and with no "hand waving" (everything was explained fully). The lectures were quite full-on in terms of content but very worthwhile attending and concentrating in.

Tutorial (1 hour)

In tutorials we were provided with questions which we did on our own or in groups. The lecturer would roam around, providing assistance where it was required. There were also intermittent collaborative assessments which were held in the tutorial classes every few weeks.

Workshop (1 hour)

In the workshops, the lecturer went through examples on the board. The questions were released before the workshops, so students had the opportunity to attempt them beforehand.

iLectures Quality

Learning activities recorded: Lecture

Teaching style lent itself to being recorded: no

The notes on the whiteboard were not always legible on the recording. It was advantageous to attend.

Learning materials

Textbook

No textbook was prescribed for this unit.

List of other learning materials

- » Lecture notes (typed pdf/ LaTeX document)
- » Tutorial Questions
- » Workshop questions

Usefulness of learning materials

All the questions provided were very good practice for assessments often specifically designed to help with assessments.

The notes were thorough and rigorous, but some people found them a bit too mathematical to follow. Taking down the handwritten notes in the lectures provided an adequately condensed version of the lecture notes. Extensive study from the provided lecture notes was by no means required to perform well in this unit, however they were useful and indeed interesting for those who are particularly mathematically inclined.

General comments

In this unit each new topic built upon previous topics.

This unit was taught from the point of view of a pure mathematician. Those who appreciate mathematics will enjoy this unit. You gain a mathematically rigorous understanding of many mathematical tools that you may have previously taken for granted.

The lecturer ran extra revision classes before the tests and exam which were very useful, the lecturer was keen for us to succeed.

All this being said, many students struggled with this unit, probably owing to the need for a strong conceptual understanding. This is quite the opposite of a "hack" unit.

Industry knowledge

Computer languages and software

Although no computer languages are directly used in this unit, this unit can provide one with a greater understanding of vectors and arrays. In particular, the R language is designed for vector and array operations.

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Unit Guides
MATH2010 Linear Algebra 2

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Industry practice

None.

Links to other units

Useful knowledge from previous units

MATH1015 (Linear Algebra 1) or equivalent is assumed knowledge in this unit and knowledge from this is used from the get-go. A non-compulsory revision lecture is run in the first week as a refresher.

If you did MATH1017 and MATH1018 (Accelerated Mathematics), you may have done a number of the topics covered in this unit already.

Least squares was taught in STAT1000 but it is likely this unit will give one a better retrospective understanding of least squares than STAT1000 being useful knowledge.

Overlap with other units commonly taken concurrently

N/A

Useful topics for future units

N/A

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Unit Guides
MATH2011 Operations Research

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Table of Contents

MATH2011 Operations Research

Unit nickname	Previous unit name
O.R.	N/A

Challenge rating	Type of unit		Exemption
2	Optional		N/A

Information based on	Availability
Semester 1 2018	Semester 1 only

Prerequisites for this unit…	This unit is a prerequisite for…
MATH1015 or MATH1017	Nil
MATH1016 or MATH1018	

Reliability of information

We suggest you check the published unit outlines for more information.

Syllabus/ Topics

- » The nature of operations research (OR)
- » Linear programming (LP) models and optimization problems
- » Two variable LP problems
- » Basic theory of linear systems
- » The simplex algorithm of LP
- » Duality
- » Sensitivity analysis
- » The transportation problem
- » Network analysis
- » Quadratic programming
- » Games theory

Assessments

Assessment name	Weighting
Take home exercises	15%
Test	25%
Final Exam	50%
Tutorial Portfolio	10%

Learning activities

Lecture (2 hours)

The lecturer excellent at explaining the methods behind the theory in order to enhance student's understanding of the content.

Tutorial (1 hour)

Workshop (1 hour)

In the workshop we went through past exam questions together which prepared us well for the exam.

iLectures Quality

Learning activities recorded: Lecture

Teaching style lent itself to being recorded: No

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Unit Guides
MATH2011 Operations Research

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The lecture quality was poor due to heavy use of the whiteboard by the lecturer. The camera didn't follow and zoom correctly. However, the lecture notes were sufficient to fill the gaps in the lecture.

Learning materials

Textbook

No textbook was prescribed for this unit.

List of other learning materials

- » Lecture notes
- » Supplementary notes

Usefulness of learning materials

The lecture notes were incredible, with fully worked and explained examples.

General comments

The workload for this unit was manageable and content was taught well.

Industry knowledge

Computer languages and software

None.

Industry practice

None.

Links to other units

Useful knowledge from previous units

Basic calculus and linear algebra from first year maths units

Overlap with other units commonly taken concurrently

Lagrange multipliers are also used in MATH2009.

Useful topics for future units

N/A

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Unit Guides
MATH2015 Mathematical Computing

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MATH2015 Mathematical Computing

Unit nickname	Previous unit name	
Computing	N/A	

Challenge rating	Type of unit	Exemption
2	Optional unit	N/A

Information based on	Availability
Semester 1 2017	Semester 1 only

Prerequisites for this unit…	This unit is a prerequisite for…
MATH1015 or MATH1017	Nil
MATH1016 or MATH1018	

Reliability of information
This unit has not been reviewed for 2 years.

We suggest you check the published unit outlines for more information.

Syllabus/ Topics

» Arithmetic computations
» Control Structures
» Data types and array processing
» Formatted input/output
» Subprograms and program design
» Direct methods for solving linear systems
» Numerical methods for solving nonlinear equations
» Interpolation and polynomial approximation
» Numerical integration

Assessments

Assessment name	Weighting
Test	20%
Practical exercises	30%
Exam	50%

In tests and exams it is advisable to make sure your notes are detailed and contain every formula you aren't 100% sure you know.

Most questions in this unit were standard so if you knew the content you were likely to score well.

The practical exercises assessment was not done in 2017, when this unit was reviewed.

Learning activities

Lecture (2 hours) and Workshop (1 hour)

In both lectures and workshops, the material was delivered by way of a PowerPoint. The lecturer would also go through some example questions in the lecture (the solutions to these were uploaded later). It must be said that the lectures didn't particularly add much to the lecture notes themselves. Depending on your style of learning you may find it easier to simply read the notes.

Practical/ computer lab (1 hour)

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Unit Guides
MATH2015 Mathematical Computing

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In the computer labs we were given exercises in Fortran to complete. The lecturer would give assistance to those who needed it. It is also presumed the practical exercises assessment is now facilitated in practicals but this was not a part of assessment at the time the reviewer took the unit.

iLectures Quality

Learning activities recorded: Lecture, workshop

Teaching style lent itself to being recorded: Yes

The iLecture quality was reasonable considering the lecturer only rarely wrote things on the board and most of that was solutions to problems which were uploaded later anyway.

Learning materials

Textbook

No textbook was prescribed for this unit.

List of other learning materials

» Lecture notes/slides in a pdf with solutions posted after the lecture.
» Practical exercises to be done in Fortran.

Usefulness of learning materials

The lecture notes were quite thorough and could be used to study without the need to attend lectures if required.

General comments

If you have done programming before, the first few weeks covering the basics of programming will be very straight forward for you.

Industry knowledge

Computer languages and software

Languages: Fortran

Programming language Fortran used in this unit. This unit will teach you the basics of programming if you have not previously learnt them in a way that you may apply to other languages. Fortran is however quite an archaic language and not commonly used in industry. It is however still commonly used for large scale numerical calculations due to its efficiency.

Industry practice

Numerical methods are commonly used in industry since analytical solutions are not always (even seldom) possible in practice. This unit provides one with a solid conceptual understanding of these methods which gives one more confidence when applying the algorithms in practice. The value of understanding these methods beyond a black box approach should not be overlooked.

Links to other units

Useful knowledge from previous units

Any previous programming units would be useful.

This unit relies heavily on content from the mathematical prerequisites for this unit.

If you did MATH1017 and MATH1018 (Accelerated Mathematics), you will have encountered some of the theorems that underpin numerical methods already.

Overlap with other units commonly taken concurrently

N/A

Useful topics for future units

This unit will provide one with an actual understanding of numerical methods which are covered (in little to no detail) in MATH2005.

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Unit Guides
STAT2003 Analytics for Experimental and Simulated Data

Contribute

Table of Contents

STAT2003 Analytics for Experimental and Simulated Data

Unit nickname	Previous unit name
EDA	STAT2000 Experimental Design and Analysis (2017)

Challenge rating	Type of unit	Exemption
2	Optional unit Compulsory unit in for the applied statistics third year stream from 2022 onward.	N/A

Information based on	Availability
Semester 2 2017	Semester 2 only (2020 and prior) Semester 1 only (2021 onward)

Prerequisites for this unit…	This unit is a prerequisite for…
STAT1000	STAT2004

Reliability of information

This unit has undergone significant changes since this guide was written, coinciding with a change in the unit name.

We suggest you check the published unit outlines for more information.

Syllabus/ Topics

- » Experimental designs
- » ANOVA
- » Contrasts and multiple comparisons
- » Completely randomized design
- » Randomised block designs and analysis
- » Latin square designs and analysis
- » Factorial method of experimentation
- » Response surface method and optimal designs
- » Designs for computer simulated experiments
- » Meta models for computer simulated experiments

Assessments

Assessment name	Weighting
Test	10%
Assignment 1	20%
Assignment 2	20%
Examination	50%

Learning activities

Lecture (2 hours)

The lecture and workshop were conducted together, and it was encouraged you bring a laptop or similar device during class to follow along with the lecturer. Attendance was not assessed but participation was. Speaking up here and there was sufficient.

Tutorial (1 hour)

Computer Lab (2 hour)

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Unit Guides
STAT2003 Analytics for Experimental and Simulated Data

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Students were given a worksheet to complete during class and if you were stuck, the lecturer was able to help. The lecturer did not go through the worksheet in front of the class. The majority of it was independent work.

iLectures Quality

Learning activities recorded: Lecture

Teaching style lent itself to being recorded: Somewhat

The iLectures were of poor visual quality but acceptable audio quality.

Learning materials

List of other learning materials

- » Lecture note pack-pdf
- » Workshop sheets-pdf
- » Datasets for workshops

Usefulness of learning materials

The lecture notes were good for learning on your own. We were not provided with solutions to the workshop sheets.

General comments

N/A

Industry knowledge

Computer languages and software

Languages: R

Software: RStudio

Used at an intermediate level.

Industry practice

None.

Links to other units

Useful knowledge from previous units

Linear regression from STAT1000.

Overlap with other units commonly taken concurrently

N/A

Useful topics for future units

N/A

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Unit Guides
INDE3000 Industrial Modelling and Optimisation

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3000 Units

INDE3000 Industrial Modelling and Optimisation

Unit nickname		Previous unit name	
N/A		N/A	
Challenge rating	**Type of unit**		**Exemption**
?	Optional unit		N/A

Information based on	Availability
Yet to be reviewed	Semester 1 only

Prerequisites for this unit…	This unit is a prerequisite for…
MATH2011	Nil
MATH2010	

Reliability of information

We are yet to receive a submission for this unit. If you have taken this unit recently, please help us out by contributing as directed in the link at the top right of the page.

We have provided as much information as we can find without input from those who took the unit.

We suggest you check the published unit outlines for more information.

Syllabus/ Topics

- » Integer Programming
- » Better formulations and pre-processing
- » Linear programming and dual simplex algorithm
- » Branch-and-Bound algorithms

Assessments

Assessment name	Weighting
Assignment	20%
Test	30%
Exam	50%

Learning activities

Lecture (3 hours)

Tutorial (1 hour)

Learning materials

Textbook

No textbook was prescribed for this unit.

Industry knowledge

Computer languages and software

None.

Industry practice

None.

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Unit Guides
INDE3000 Industrial Modelling and Optimisation

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Links to other units

Useful knowledge from previous units

N/A

Overlap with other units commonly taken concurrently

N/A

Useful topics for future units

N/A

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Unit Guides
INVE3000 Introduction to Derivative Securities

Contribute

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INVE3000 Introduction to Derivative Securities

Unit nickname	Previous unit name
Derivatives	N/A

Challenge rating	Type of unit	Exemption
?	Optional	N/A

Information based on	Availability
Yet to be reviewed	Both Semesters

Prerequisites for this unit…	This unit is a prerequisite for…
FNCE2000 Introduction to Finance Principles	Nil
MATH2009 Calculus 2	

Reliability of information

We are yet to receive a submission for this unit. If you have taken this unit recently, please help us out by contributing as directed in the link at the top right of the page.

We have provided as much information as we can find without input from those who took the unit.

We suggest you check the published unit outlines for more information.

Syllabus/ Topics

- » Introduction and securities markets
- » Risk and return measurement
- » Optimal asset allocation
- » Capital market equilibrium
- » Market efficiency and behaviour finance
- » Fixed-income securities
- » Equity security analysis
- » Options markets
- » Futures markets
- » Portfolio performance evaluation

Assessments

Assessment name	Weighting
Assignment 1	25%
Mid Semester Test	25%
Final Examination	50%

Learning activities

Lecture (2 hours)

Tutorial (1 hour)

Learning materials

Textbook

Textbook reference: The fundamentals of futures and options markets by John Hull

Textbook importance: required

Industry knowledge

Computer languages and software

None.

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Unit Guides
INVE3000 Introduction to Derivative Securities

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Industry practice

Further understanding of derivatives would be particularly beneficial for those seeking employment in roles which work more closely with these instruments e.g. options trader, investment banker.

Links to other units

Useful knowledge from previous units

N/A

Overlap with other units commonly taken concurrently

This unit has significant overlap with STAT3007 Financial Engineering 2. The approach taken however, is far less mathematically rigorous.

Useful topics for future units

N/A

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Unit Guides
INVE3001 Portfolio Management

Contribute

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INVE3001 Portfolio Management

Unit nickname	Previous unit name
N/A	N/A

Challenge rating	Type of unit	Exemption
?	Optional Unit	N/A

Information based on	Availability
Yet to be reviewed	Both Semesters

Prerequisites for this unit…	This unit is a prerequisite for…
FNCE2000 (Introduction to Finance Principles)	Nil
Calculus 2	

Reliability of information

We are yet to receive a submission for this unit. If you have taken this unit recently, please help us out by contributing as directed in the link at the top right of the page.

We have provided as much information as we can find without input from those who took the unit.

We suggest you check the published unit outlines for more information.

Syllabus/ Topics

- » Introduction and securities markets
- » Risk and return measurement
- » Optimal asset allocation
- » Capital market equilibrium
- » Market efficiency and behavioural finance
- » Fixed-income securities
- » Equity security analysis
- » Options markets
- » Futures markets
- » Portfolio performance evaluation

Assessments

Assessment name	Weighting
Mid-semester test	25%
Group report	35%
Final examination	40%

Learning activities

Lecture (2 hours)

Tutorial (1 hour)

Workshop (1 hour)

Learning materials

Textbook

Textbook reference: Investments by Bodie, Z. , A. Kane, and A.J. Marcus

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Unit Guides
INVE3001 Portfolio Management

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Industry knowledge

Computer languages and software

None.

Industry practice

None.

Links to other units

Useful knowledge from previous units

N/A

Overlap with other units commonly taken concurrently

N/A

Useful topics for future units

N/A

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Unit Guides
MATH3000 Mathematical Methods

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MATH3000 Mathematical Methods

Unit nickname		Previous unit name	
Maths Methods		N/A	
Challenge rating	**Type of unit**		**Exemption**
3	A possible elective for those in the applied statistics major		N/A

Information based on	Availability
Yet to be reviewed	Semester 1 only

Prerequisites for this unit…	This unit is a prerequisite for…
MATH2009 Calculus 2	Nil

Reliability of information

We are yet to receive a submission for this unit. If you have taken this unit recently, please help us out by contributing as directed in the link at the top right of the page.

We have provided as much information as we can find without input from those who took the unit.

We suggest you check the published unit outlines for more information.

Syllabus/ Topics

- » Complex analysis
- » Laplace transforms
- » Special functions
- » Generalised functions
- » Sturm-Liouville systems
- » Green's functions

Assessments

Assessment name	Weighting
Assignment 1	16%
Assignment 2	10%
Test	24%
Examination	50%

Learning activities

Lecture (3 hours)

Computer Lab (1 hour)

Learning materials

Textbook

No textbook was prescribed for this unit.

Other learning materials

Lecture notes (pdf/LaTeX document, hard copy provided)

Worked Examples (pdf/LaTeX document)

Industry knowledge

Computer languages and software

None.

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Unit Guides
MATH3000 Mathematical Methods

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Industry practice

None.

Links to other units

Useful knowledge from previous units

If you took Accelerated mathematics 1 and 2 in first year, you were at an advantage in this unit. Methods of proof, linear properties, limits, trigonometric identities and mathematical notation were used in this unit (they were revised but likely something of a learning curve for those who took Linear Algebra 1 and Calculus 1).

Partial fractions from first year maths unit was used in this unit. The "cover the factors" method taught in accelerated mathematics was preferred.

Complex numbers from first year maths were uses heavily in the complex analysis part of this unit. Finding zeros of complex polynomials, polar form of complex numbers and properties of complex number (including modulus, argument, conjugate etc,) were all used constantly. Again, students who took accelerated mathematics were at an advantage here as they covered these topics in more detail.

Integration techniques (in particular integration by parts, "tabular" integration, trigonometric integrals, etc.) from first year maths were used heavily throughout this unit.

Linear differential equations (both first and second order), as well as the ideas behind partial differential equations, variation of parameters, and Fourier series were all useful topics from Calculus 2 for Sturm-Liouville problems.

Overlap with other units commonly taken concurrently

N/A

Useful topics for future units

N/A

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Unit Guides
MATH3001 Applied Mathematical Modelling

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MATH3001 Applied Mathematical Modelling

Unit nickname		Previous unit name	
N/A		N/A	
Challenge rating	**Type of unit**		**Exemption**
?	Optional unit		N/A

Information based on	Availability
Yet to be reviewed	Semester 2 only

Prerequisites for this unit…	This unit is a prerequisite for…
MATH2009 Calculus 2	Nil

Reliability of information

We are yet to receive a submission for this unit. If you have taken this unit recently, please help us out by contributing as directed in the link at the top right of the page.

We have provided as much information as we can find without input from those who took the unit.

We suggest you check the published unit outlines for more information.

Syllabus/ Topics

- » Newton's law
- » Suffix notation and tensor operations
- » Stress equations of motion
- » Rate of strain tensors and constitutive equations
- » Fluid dynamics
- » Mathematical modelling of fluid flows
- » Mathematical modelling of heat transfer
- » Convection-diffusion process and application
- » Mathematical models in Black-Scholes option prices

Assessments

Assessment name	Weighting
Mid – Semester test	30%
Assignment	20%
Final Examination	50%

Learning activities

Lecture (2 hours)

Tutorial (1 hour)

Workshop (1 hour)

Learning materials

Textbook

No textbook was prescribed for this unit.

Industry knowledge

Computer languages and software

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MATH3001 Applied Mathematical Modelling

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Industry practice

None.

Links to other units

Useful knowledge from previous units

N/A

Overlap with other units commonly taken concurrently

N/A

Useful topics for future units

N/A

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Unit Guides

Third Year Industrial Project (MATH3004)

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Research Projects

Third Year Industrial Project (MATH3004)

Students in the actuarial and applied statistics stream are required to undertake an industrial project. Actuarial science stream students can also take it as an optional unit if they wish. We suggest you consult the published unit outlines for more information.

We are yet to receive a submission for this unit and as such we have omitted any sections that require the input of someone who has taken the unit. If you have taken this unit recently and would like to contribute to the guide, please get in touch with us as directed in the link in the top right of each page. While it is not exactly the same some of the information on the honours dissertation below might prove useful for those taking the industrial project.

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Honours Dissertation (STAT4004 and STAT4001)

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Honours Dissertation (STAT4004 and STAT4001)

In addition to course work (units that provide exemption from the Actuary Program) Actuarial Science Honours students must complete a research project (dissertation) that spans the entire year. This is done through two units, STAT4004 Actuarial Science Honours Dissertation 1 (replacing STAT4000 in 2020) and STAT4001 Actuarial Science Honours Dissertation 2. Consult the published unit outlines for STAT4000, STAT4001 and STAT4004 for more information.

Note that the writer of this section did STAT4000 (25 credit points), which has now been replaced by STAT4004 (50 credit points). Apart from the change in credit points, little is expected to have changed.

How the dissertation is assessed

Students complete STAT4004 in the first semester where a project proposal is completed and given a pass/fail grade (it does not contribute to your course weighted average). In STAT4001, taken in second semester, you will receive a final grade based on your final project comprising of project management (10%), report (70%) and presentation (20%).

The project proposal will end up being half final report as it includes all the same sections (research questions, literature review, methodology etc.) except for the results and the conclusion. Students will be required to produce a draft report in the middle of semester so you should have obtained most of your results at this point. This draft version is worth 0% of your final grade however and is only for feedback purposes. While the proposal and draft will be marked by your supervisor (with feedback), the final report and presentation will be marked by other academics/lecturers.

One's performance in the honours dissertation is a strong contributor to the class of honours (e.g. First Class Honours) one receives.

Choosing your topic

You will have the opportunity to choose your own topic and supervisor. These are incredibly decisions as once you have made them, you will be stuck with them for the entire year.

You have the freedom to choose any topic you like as long as it is relevant to actuarial science. This quite a broad umbrella given actuarial science combines aspects of statistics, mathematics, finance, economics and computing. A good first step is to think back to the units you have taken so far and which ones you found the most interesting. While a specific project idea might not spring to mind straight away it could help you narrow it down further so it is easier to ask for help.

When looking for a supervisor you should try to find a lecturer you know and like already. You should also consider whether their research interests align with the topics you are interested in. Some supervisors may also assist you with choosing a more specific topic if you provide them with a more general area of interest.

There are often organisations that offer scholarships to do research in a particular field (e.g. agriculture or mining). In addition to the monetary incentives, this can suit some people quite well as they are likely to be provided with a lot of guidance and scope for what must be done in their project. There are pitfalls with this as well however as there can often be unforeseen challenges (e.g. obtaining data) and there will be expectations on you to produce work that adds value.

You can also use the topic you choose to help you learn or delve more deeply into a particular skill. For example:

» Choosing a topic that requires a lot of data visualisation, analysis and visualisation might allow you to further develop your R or Python programming skills.
» You might choose a topic related to machine learning to learn more about that area.
» If you aspire to work in a particular industry (e.g. general insurance), you might want to choose a topic that related to that industry.

Using LaTeX to write your dissertation

While your immediate thought might be to use Microsoft Word to write your project proposal and report, this is not necessarily the optimal choice. LaTeX is the program used be the majority of mathematical researchers. LaTeX is worth learning, particularly if your report contains a considerable amount of mathematics.

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If you look up "LaTeX vs. Word", you might find a study that suggests that Word is in fact better for productivity. This study has been criticised by due to its lack of attention to tasks that are actually required when writing a research paper. The study also admits that mathematical equations in LaTeX are vastly superior. The key here is what they are used for.

Word works fine for short and simple documents but becomes unstable and frustrating to use once you begin working on longer, more complex documents (such as an honours dissertation with a significant amount of mathematics). This is where LaTeX's performance shines through.
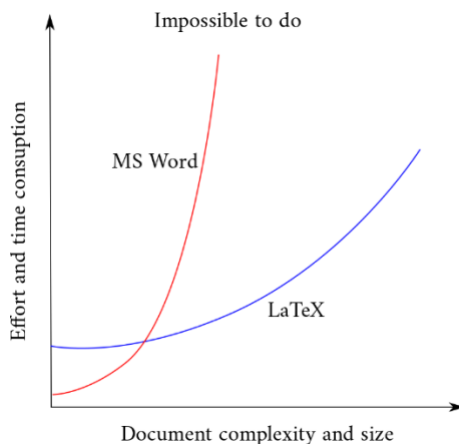
In its purest form, LaTeX is an input-output system where you write 'code' in a .tex file and then compile it to produce a .pdf file. For those who have only ever used a "what you see is what you get" (WYSIWYG) word processors such as MS Word, LaTeX might prove unintuitive at first. However, the initial time it takes to learn will pay dividends in the long run. While you often need to click through several menus to perform certain tasks in Word, in LaTeX everything is done using the keyboard, by typing out commands.

Many of the Curtin mathematics and statistics lecturers and academics are familiar with LaTeX and your supervisor may even encourage you to use it. It is also possible that you supervisor will not know it (particularly if they are one of the actuarial staff) but you should not let this discourage you. If you have never used it before, it is still possible to learn and you will thank yourself later if you use it from the very beginning.

Here is a LaTeX template for formatting your paper (assuming the requirements for formatting are the same as they were in 2019).

Getting started with LaTeX

Unlike Word, LaTeX is free and open source. There are actually multiple ways to get it set it up on your computer, we provide two recommended ways here:

Local installation (distribution and editor): you need two things, a TeX distribution (https://www.latex-project.org/ recommends MikTeX for Windows, MacTeX for Mac, TeXLive for Linux) and a LaTeX editor (TeXStudio recommended). You can then create and edit LaTeX documents on your local drive.

» Having a LaTeX distribution installed locally on your machine has the added benefit of allowing you to knit to pdf in RMarkdown. Note that there is another distribution called TinyTeX that is a little bit smaller and specifically created for use with RMarkdown.
» There are many editors out there and if you have a preferred language-agnostic text editor for coding such as Vim or Sublime Text, it is possible to set it up for LaTeX.
» There is an extensive list of LaTeX editors in this Stack Exchange post if you are looking to investigate your choice further.

Through a browser (Overleaf): go to https://www.overleaf.com/register and create a free Overleaf account. Once you have done this, you will immediately be able to start creating and editing your very own LaTeX documents through your browser on the cloud.

» This method does not require you to install a TeX distribution but you may wish to anyway as a backup in case the Overleaf servers are down. Some Overeaf users have no idea how to compile locally, don't be one of these people.

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Honours Dissertation (STAT4004 and STAT4001)

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- » This method will allow you to pick up where you left off on any computer (just log in). This is pretty handy since Curtin's computers (with the exception of the office computers of some academics) do not have LaTeX installed.
- » Overleaf also has a paid version that allows you to collaborate with others.
- » Overleaf has millions of users worldwide and thousands of templates. Some external websites even have an option to open LaTeX source code in Overleaf.

Once you get it installed, here are some resources for learning how to use LaTeX:

- » The not so short introduction to LaTeX2e is commonly cited a great resource for learning LaTeX.
- » The Curtin Student Actuarial Society ran a LaTeX workshop in 2019 and still have the materials up on there website at https://www.curtinactuary.com/latex-workshop/materials at the time of writing.
- » There are a number of tutorials on YouTube for learning LaTeX, the one by Michelle Krummel is one of the better ones out there, it is well-delivered and comprehensive. Bear in mind however, that some of the ways of doing things shown in this series of tutorials are not considered best practice (e.g. using eqnarray instead of align).
- » Overleaf has a number of excellent tutorials on specific topics on their website.

To prepare yourself for writing your academic paper, pay particular attention to learning the following topics in LaTeX:

- » Document basics such as spacing and sections
- » Tables of contents
- » Formatting figures and tables
- » Including graphics (you can include pdfs as images and it will recognise the text as text)
- » Equations
- » Referencing using BibTeX or Natbib
- » Cross references with the 'hyperref' package.
- » Code listings (if you want to provide code snippets in your appendix)

While LaTeX does not see much used in industry, it can be useful for the following once you have learned it:

- » There a number of great LaTeX templates for writing resumes. LaTeX is actually quite suited to this tasks.
- » You can create presentations with a lot of maths in them using a LaTeX document class called beamer

Careers

Programs

There are dedicated programs designed as a pathway for students to transition from university into the firm. Students can jump directly from their degree to a permanent position, but this is a more realistic pathway to pursue.

Vacation programs/Internships

We cannot overstate the importance of landing an internship (preferably) in the penultimate year. An internship is proof to employers of your focus on your career, as well as ineffably valuable experience in the field. In a nutshell: It makes getting a graduate role a whole lot easier.

These usually run in the summer and winter breaks, though summer programs dominate. Summer programs usually run from 6-8 weeks.

This is a great opportunity for you to get an insider view on the industry and a firm which you are particularly interested in, whilst (hopefully) making some sweet moolah as well. Sadly, some roles do not pay, though we'd urge you to keep an open mind as the benefits for your career might outweigh the short-term sting.

Do not be dismayed if it takes a while to find the right opportunity. Even the strongest candidates receive their fair share of rejection emails.

Graduate programs

These programs generally run for about a year. They are usually full-time positions upon graduation (though some firms allow/encourage part-time during your studies). They often rotate, offering applicants the opportunity to be exposed to a range of different business functions. Sadly, this means that there is more competition than just those in the data space (depending on the opportunity). The aim of a graduate program for the firm is to find an area in which you are interested in and which firm has a need, with a permanent position in mind.

We strongly encourage you to keep Just how important is academic performance? and Soft skills in mind, particularly as Actuarial students are already technically sound. That said, we do encourage you to brush up on some Technical skills, particularly programming languages such as python to stand out and have more to talk about during your interviews.

The stakes are high and students generally apply for these in their final year. This means countless ability tests and (hopefully) interviews whilst taking on the most demanding units the degree has to offer. Naturally this is another load on students both time wise and mentally. Some joke that it can be like taking on another unit. Just like with vacation programs, do not be dismayed if you receive more than a few rejections. Keep trying and do not put too much pressure on yourself. The right opportunity will come.

Where to apply

Applying for jobs can be a stressful and time-consuming experience. It can be difficult to know where to apply with the plethora of companies out there. Sometimes actuarial science will not be listed on the degrees a company is looking for but that does not mean you shouldn't apply. Selling your skills can be a big part of being successful at job applications. In this subsection, we describe some of the industries actuarial students have found themselves working in, in the past.

Below is a list of industries actuarial students may wish to apply for.

Note that the companies mentioned below are not necessarily an exhaustive list. Those who have a prominent office in Perth, will be in **bold** (note that we may not bold a company that has offices in Perth due to the fact their actuarial intake is over east).

See the Careers Websites subsection under 'Useful Information for Students' above for more information of where to find opportunities.

A note on actuarial roles

Actuarial science students at Curtin will often not end up in "actuarial" roles. It is far more common for them to be a consultant (but not an actuarial consultant) or even a data scientist. This is mostly due to the lack of entry-level opportunities to work in traditional actuarial roles in Perth, the situation is different in Sydney and Melbourne. This is not necessarily a bad thing as these are still great roles on which to begin one's career, being in a job that is labelled "actuarial" does have its benefits.

A key benefit of being in an actuarial role is the support you get in pursuing your actuarial fellowship. If you hold an actuarial role (whether as an actuarial consultant or actuarial analyst), not only will your employer typically pay for your exams and offer you study leave but you will also have a network of colleagues who have been or are going through the same thing who can offer support. In contrast, those that pursue their fellowship while working in a non-actuarial role will likely receive no support from their employer (through leave or financial contributions to exam) and may well be isolated by the fact that none of their colleagues are doing the same thing as them. Doing it in the latter way is not impossible but it does add extra difficulty to an extremely challenging uptaking.

With all this said becoming a fully qualified actuary is not for everyone and the actuarial science degree can prepare you for a stellar career regardless. It is highly likely that you will have to move interstate in order to find work as an actuary due to the small market in Perth. There is a clear trade-off here.

Consulting

A great number of actuarial students end up in consulting of some sort. Consulting varies greatly in terms of the roles (management, data science, strategy, actuarial etc.), as well as the clients you work with. Starting your career in consulting will give you a breadth of experience that will hold you in a high standing for the remainder of your career.

Large accounting firms

Example companies	**PricewaterhouseCoopers (PwC), KPMG, Ernst & Young (EY), Deloitte**
Roles for actuarial students	Actuarial
	Risk analytics
	Assurance
	Data-driven disruption of traditional accounting areas such as tax
Pros	Exposure to many industries and projects
Cons	Low starting salary
Warnings	PwC is the only one of the big 4 to have an actuarial team in Perth

The four firms above are often referred to as the "Big 4 accounting consultancy firms". They will each sell their differences to you but fundamentally they are all very similar entities who largely fight for the same clients.

These firms are likely to have the largest recruiting presence on campus out of all mentioned here. They typically each run a number of events throughout the semester for students to gain exposure to their firm. They are also the only firms to offer a program available for first year programs. These are one to two-day programs.

These firms are likely to be the ones you hear the most from but that does not necessarily mean they are the right fit for you. A number of actuarial students will typically end up at these firms each year but you should not feel like your career is over

An important detail which is important to mention, is that graduate roles at the big four provide a rather low salary compared to other industries we mention here. There may be higher potential for growth in the future if you progress quickly, however.

Although actuarial students will typically work in data-related roles, it is possible to get roles in some sort of advisory service line or even disrupt more traditional accounting services such as tax or audit with data science.

At least at the beginning, PwC's Perth actuarial role is likely to be the most coveted by actuarial students. Keep in mind that they will typically only hire one graduate and this person will usually be someone who interned with them in the summer prior to third year.

Large management consulting

Example companies	**Bain & Company, Boston Consulting Group (BCG), McKinsey & Company**
Roles for actuarial students	Consultant
Pros	Challenging work
	Prestige
Cons	Long hours
Warnings	The interviews for roles at these firms are notoriously rigorous, some applicants study for them weeks in advance.

The three companies mentioned above are known as the "big 3 management consulting firms". They have a huge reputation internationally and have a tendency to seek high performing people to work for them.

Technical consulting (data science and actuarial)

Example companies	Finity, Quantium, Taylor Fry, AlphaBeta , Milliman,
Roles for actuarial students	Actuarial consultant
	Data scientist
	Statistician
Pros	Challenging and stimulating work
Cons	Long hours
Warnings	

Each of these firms are quite distinct in their own right but what they have in common is that they value technical ability much more than most consulting companies do.

These companies are all very focused on hiring the crème of the crop in terms of academic performance, while also ensuring they are well-rounded individuals. Finity and Taylor Fry are both predominately actuarial consulting companies. Finity employs the most actuaries in Australia and has a culture that values hard work but also celebrates success. Taylor Fry values research and development and has a reputation for hiring people with PhDs (although it is certainly not a requirement). Roles at both companies are highly competitive and sought after by actuarial students at eastern states universities.

Specialised management consulting

Example companies	**Data Analysis Australia, Visagio**
	AlphaBeta
Roles for actuarial students	Management Consultant
	Statistician/ Data Scientist
Pros	Challenging and stimulating work

Cons	Long hours
Warnings	

Visagio is a smaller management consulting that has sprung up in Perth only recently and appears to have taken a liking to actuarial students as a number of Curtin actuarial students have managed to land roles there. Visagio is actually a Brazilian company which means they do things a little differently to other firms. They hire university students by offering them "internships" where they work part time while studying during the semester and then full time outside of the semester. Once they complete their degree they will typically continue working.

Small management consulting

Example companies	**Global IO, Churchill, Nous Group**
Roles for actuarial students	Consultant
Pros	Projects vary case to case and provide unique and interesting work, always looking to expand so opportunities for partner may become available down the road, early chances of high responsibility, less bureaucracy, travel opportunities to different offices.
Cons	Fewer jobs available, less training – somewhat 'thrown into the deep end', stability risk if the consulting firm is very small.
Warnings	Opportunities are not as well advertised on the usual mediums such as GradAustralia, GradConnections or Curtin UniHub (to name a few), generally a deeper dive into other recruiting sites or LinkedIn may be required. As a whole, many smaller companies are experiencing growing numbers of employees (up to 25% over 2 years for Nous Group), many more opportunities are becoming available in the analytics space – though it is still essential to have transferrable skills and to think with a business mind to progress businesses.

Banking and finance

Commercial banks

Example companies	**BankWest, P&N Bank**
	Commonwealth Bank, NAB, Westpac, ANZ
Roles for actuarial students	Risk management
	Data science
Pros	Broad range of areas to work in
Cons	"Regulatory scrutiny"
Warnings	The only bank to offer roles that are relevant to the actuarial degree in Perth is at BankWest. Those with offices in Perth don't seem to perform much quantitative work here.

These are banks that provide savings account, transactions account, loans and other lines of credit to both individuals and businesses.

BankWest is the main commercial bank in Perth. It is actually owned by Commonwealth Bank but still acts as a somewhat separate entity.

P&N Bank is a mutual bank which means it is owned by its customers rather than shareholders (unlike all the other example banks above). This structure essentially means that any profits made by the bank are meant to go towards furthering customer outcomes. It is something of a debate as to whether this structure

actually results in better outcomes in reality. It also resides in Perth but is considerably smaller than BankWest.

Investment banks

Example companies	Macquarie Bank, Goldman Sachs, JPMorgan Chase, Morgan Stanley
Roles for actuarial students	Quantitative finance
	Risk management
Pros	High remuneration
Cons	Long hours
Warnings	These companies can have exclusive HR practices where they only hire from certain programs at certain universities (e.g. UWA and not Curtin).

Investment banks serve to assist large firms with raising capital and facilitate transactions of financial securities. They are not the "banks" you as an individual can hold a saving account and take out a loan with, although some (for example Macquarie Bank) are conglomerate banks which means they combine investment banking with commercial banking (so savings accounts do exist with Macquarie).

Some people believe that some of the large investment banks such as Goldman Sachs and Deutsche Bank are to blame for the infamous 2007/2008 global financial crisis.

Trading firms and market makers

Example companies	Optiver, IMC Trading, Akuna Capital, SIG
Roles for actuarial students	Risk
	Quantitative finance/ Trader
Pros	High remuneration and employee benefits
Cons	Can work unusual hours to match the trading hours of overseas markets
Warnings	These types of firms typically only reside over east

These trading firms use algorithms to identify arbitrage opportunities as well as act as a market maker in the APAC region. In recent years there has been a surge in Curtin students interested in trading roles at these respective firms. Students interested should be prepared to face stiff competition however as all the mentioned firms have highly competitive and technical interviewing process. Students interested in this path are recommended to become familiar with the question style of this "quant trader interview bible" textbook. *Heard on the Street – Timothy Crack.*

A particular example of a trading firm is Optiver who take students with mathematical backgrounds (from actuarial, financial mathematics, PhD and even physics) and train them in the finance they need in their first few months. They stand by the philosophy that it is easier to teach a mathematician finance than it is to teach a financier mathematics. These are quite technical roles where you are well remunerated and a highly focussed set of skills.

On quantitative finance roles in investment banks and trading firms

Some aspects of investment banking and trading firms are what is known as "quantitative finance". Those who work in this space are known as "quants". The work they perform has some similarities with actuarial work in the sense that they involve valuations, modelling and statistical analysis but are often more rigorous.

While actuarial students learn about finance and mathematics, they may require further education to obtain the level of rigour required to get into these roles. To become a "quant", you are likely to need a Master's degree in Financial Engineering or even a PhD.

Insurance

Insurance is the tradition area where actuaries reside. This is the industry where you can find work that is the most relevant to your actuarial degree. Keep in mind however opportunities to work in Insurance in Perth are very limited. Contrary to what some actuarial lecturers may tell you, it is only a small minority of Curtin actuarial students who end up in the insurance industry.

Life insurance

Example companies	AIA , Manulife , Prudential, Zurich Insurance
Roles for actuarial students	Actuarial analyst
Pros	What is taught in the actuarial curriculum so far in will be applicable in these companies and roles
Cons	Due to the fact that majority of life insurance companies are comparatively large and multinational, one may experience bureaucratic inefficiencies within the workplace
Warnings	The head offices for life insurers are all over east and overseas.

General insurance

Example companies	**RAC**
Roles for actuarial students	Actuarial analyst
	Generic business (potential for data science)
Pros	Shorter hours, exposure to the inner workings of an insurance company
Cons	Less variety of work
Warnings	

RAC is the only general insurer in Perth and have a very small actuarial team. They are not in the practice of hiring actuarial graduate roles but do sometimes offer actuarial internships. They have recently started a more general graduate program, targeted at business/commerce and data science students this is not an actuarial role but could be an opportunity to get into the general insurance industry.

Health insurance

Example companies	**HBF, BUPA, HIF, AHM, Medibank (see https://privatehealth.gov.au/dynamic/insurer)**
Roles for actuarial students	Business analyst, Actuarial analyst, Data Analytics
Pros	Decent Renumeration, Discounts on insurance products (yourself and family), Free outdoor fitness sessions, work-life balance (Flexi-hours)
Cons	Highly regulated industry
Warnings	

HBF is the only major health insurer in Perth and have recently hired a new in-house appointed actuary. HBF are currently expanding their actuarial team so new opportunities may become available. They also have a more general business analyst graduate program with the potential for rotations in data analytics roles.

Health insurance industry as a whole is facing immensely challenging affordability and sustainability issues.

Reinsurance

Example companies	Munich Re, Swiss Re, SCOR
Roles for actuarial students	Actuarial Analyst, Pricing analyst
Pros	High remuneration
Cons	Long hours
Warnings	Most opportunities in this sector reside over east or even overseas as many reinsurers are global companies.

Reinsurers can be thought of as *insurers for insurance companies*. They often cover a certain layer of claims if a high volume of claims are experiences by a covered insurance company. They also provide secondary services such as their expertise for underwriting and pricing. There are only a small number of reinsurers globally and they each write policies to insurers across the world and in multiple insurance segments to fully realise the statistical advantages of risk pooling and diversification.

Public sector

Government departments

Example companies	**Department of Finance, Australian Bureau of Statistics** Treasury, Australian Government Actuary
Roles for actuarial students	Generic rotation
Pros	Above average super Work-life balance
Cons	Lower salary celling and potential for career progression than private sector
Warnings	

Regulators

Example companies	APRA, ASIC
Roles for actuarial students	Generic rotation
Pros	A rather unique perspective on financial services
Cons	Lower salary ceiling and potential for career progression than private sector
Warnings	Opportunities generally only available in the Eastern states.

For those that don't know, ASIC (Australian Securities and investments Commission) and APRA (Australian Prudential Regulatory Authority) are Australia's *market conduct* and *prudential* regulators, respectively. They are both there to protect consumers (and other stakeholders such as creditors and investors) but each has a different way of approaching it. ASIC do so by monitoring market misconduct, exploitation and transparency and APRA do so by ensuring companies are managing their risks appropriately, so that they can meet their obligations.

Both APRA and ASIC have a rotation-style graduate program across various divisions of their operations (both include data analytics). Generally speaking, APRA is considered slightly more relevant to actuarial due to their focus on solvency in the financial services industry (insurance and super in particular) but both are keen to hire actuarial students for their analytical skills.

Resources

Mining

Example companies	**BHP, South32, Rio Tinto**
Roles for actuarial students	Data scientist
Pros	Generous remuneration
	Opportunities for travel
	Exposure to complex/fascinating business applications
	Professional development opportunities
Cons	Exposure to the rather cyclical mining sector
	Potential long hours when travelling to site
	Non-actuarial specific work
Warnings	You may well work for a mining company indirectly even if you become a consultant in Perth, due to the heavy influence of these companies on the Perth economy.

Many mining companies are beginning to embrace data science in a big way. A number of actuarial students have been hired by these companies in data science positions in the past so there is precedent and existing rapport there.

Oil and gas

Example companies	**Woodside, BP**
Roles for actuarial students	Data Science, Analytics, Information Technology
Pros	High remuneration, Job security for at least medium term
Cons	Large organisations – run the risk in being lost on bureaucracy, slower promotion of position due to many candidates, less travel opportunities, desk time favoured.
Warnings	Non-traditional actuarial roles, so exposure to data analysis/structures via optional units and individual projects is desired.
	Generally they will hire for a technician-like role and don't want to lose graduates to further study to become actuaries! So accepting a job here is likely to mean locking in for 5-10 years.

Other

Superannuation

Example companies	**WA Super,** AustralianSuper
Roles for actuarial students	Actuarial analyst
Pros	The opportunity to work in a changing industry
Cons	Lots of regulation
Warnings	While this may have previously been considered a traditional actuarial role, defined benefit super is seldom offered anymore in Australia and any existing funds are running off their remaining accounts. This means that most roles in super will be in the

investments space working how to invest the defined contributions appropriately.

Conglomerate

Example companies	**Wesfarmers ,**
Roles for actuarial students	
Pros	
Cons	
Warnings	You will need to sell your transferable skills to them as they may not hold actuarial students in as high regard as others.

Research and academia

Example companies	**CSIRO, Curtin University, Innovation Central**
	Other universities
Roles for actuarial students	Tutor/Lecturer/Professor
	Researcher
Pros	The ability to investigate things deeply
	Explore your own ideas
Cons	Universities can be highly bureaucratic
	Can be a high stress environment with long hours
Warnings	Likely to require further study, probably a PhD.

To be employed full-time as a lecturer, you are likely to require a PhD in a related field. Some lecturers in actuarial science do not have a PhD but do have a fellowship from the Actuaries Institute. You can still get experience in tertiary teaching by becoming what is known as a sessional tutor, which is someone who is employed on a casual basis by the university to supplement the teaching of the full-time staff for units with a higher enrolment. It is possible to be a sessional tutor while completing a PhD, Masters program or in some cases, undergraduate study (honours in particular).

Work in research varies significantly but to progress in almost any research domain, you are likely to require further study (i.e. a PhD).

The Actuarial Science Honours Program

In this section, we describe the honours course in detail. In keeping with the rationale of the SAS Guide, all information is provided by students who have previously studied the honours course. Note that this information is based on 2019, prior to the significant 2020 curriculum changes so much of it is subject to some degree of change.

This section will be of interest both to those who are considering taking the honours course full time or those who are considering just taking the actuarial exemption units not-for-degree, as a private candidate (usually whilst also working full time).

Why you should(n't) do honours

If you want to become an actuary (that is, a fellow or an associate), you need to study the actuarial control cycle and the new data analytics subject through a university a university that is accredited by the Actuaries Institute (Curtin is the only one in Perth). Full-time honours is probably the most direct way of doing so. Unless your employer provides unfathomably generous study leave, it is easier being a full-time student than take the units while working.

If you are tired of university, it is advisable that you do not do honours, it is a highly intense year of university that will test even the highly motivated.

What the classes are like

Classes are almost always scheduled in the evening to accommodate those who take the part II units while working (say goodbye to 8AM starts). The earliest class experienced by or known to past students in actuarial honours units started at 3PM. Classes are likely to finish at 6, 7 or even 8 PM.

At the time of writing (in semester 1 2021), only 3 people do full-time honours, with 4 others picking up the honours units required for part II (associate level) exemptions only. These are in fact big numbers by comparison to previous years where as few as 2 people have taken honours units in total. As a result, all 2019 actuarial honours classes have had between 4 and 6 students enrolled in them. This makes for a very different dynamic in classes compared to what you'd be familiar with from your first three years of study. Firstly, classes are far more personal. While lecturers might have material prepared, lectures often flow into more of a conversation, led by the lecturer (pre-reading is therefore essential). Secondly, following on from this, if you miss a class, your absence will be felt. Skipping classes is really not an option.

Tips for success

The key to actuarial honours (or indeed taking actuarial honours units as a private candidate) is time management. You will be juggling challenging coursework with either full-time work or the honours research project (dissertation). Implementing a system to keep on top of weekly readings as well as assessments will be highly beneficial.

Classes of honours

One element of academic achievement is the so-called *class of honours* one receives. If you receive "First Class Honours", this will be indicated on your degree upon graduation.

The following table indicates the guidelines (subject to review by an Honours Committee) for classes of honours as of 2019 (changes may occur in 2020 onwards). You must satisfy all criteria to be awarded that class of honours (i.e. meet both the CWA and project mark requirement).

Class of honours	Minimum CWA	Minimum project mark
First Class	80%	80%
Upper Second Class	65%	70%
Lower Second Class	60%	60%
Third Class	50%	50%
Fail	Failure to meet either of the third class honours requirements	

Note that:

- » The project mark is included in the calculation of CWA.
- » As a rule of thumb, 80% in the project means "a thorough understanding of the topic was demonstrated".

Applying for jobs

Just how important is academic performance?

Perhaps against the common belief of some, your academic performance while at university can only get you so far when applying for professional opportunities. Not only will companies seek further evidence of your technical skills beyond what you have learnt at university, through things like previous work experience, extracurricular activities and personal projects but they are also concerned with numerous other aspects of you as a candidate including your soft skills, cultural fit with the company and being a so-called "well-rounded individual". So, the top student in terms of university grades won't necessarily get their first choice of job and a mediocre student will not be stuck will an irrelevant job or no job at all. Companies know there is more to people than their grades. They are important but it is also important to do other things.

Naturally, different companies and roles will have different expectations of academic performance so here we will give an indication of how various segments of the market approach this when hiring. Getting good grades is never a bad thing but some companies will care more about your academics than others.

Many companies will have a cut-off mark for whether they will consider a candidate or not. This is often in terms of the categorical grading scale employed by most universities (e.g. a "credit average") but could also be a course weighted average or weighted average mark[10] (e.g. an average of at least 70%). Some companies will be quite transparent about their cut-offs by stating it in job adverts but keep in mind that many companies will still have one, even if they don't say it explicitly. These cut-offs will vary by company, some companies will have very high standards because that is their idea of hiring "the best". Other companies will have lower cut-offs so they can see what more candidates have to offer.

Beyond these cut-offs, attitudes towards academics will vary widely between companies. Some companies and roles will often give some weighting to how much your marks exceed their cut-off (these will typically be more technically-oriented roles). Other companies simply ignore your academics beyond meeting their chosen cut-off and then focus solely on other aspects of you as a candidate. These firms will typically be larger companies such as the big 4 accounting firms who receive thousands of candidates in each offering.

Some roles will also care about which degree you have done. An advantage of actuarial science is that it will tick the box for many different roles with restrictive expectations on what you study. Even if they don't state actuarial science specifically, you will still typically satisfy the requirements as an actuarial student if they are looking for a mathematics, statistics, data science or (sometimes) finance student for a role.

Actuarial roles are also important to note here as many of them will have far more specific academic criteria than more generic roles. Many actuarial roles will expect you to be in an accredited actuarial program (Curtin's is one of these). They will often expect you to have obtained most or all of your exemptions and to have a high average. They will also value honours more than most roles due to the additional actuarial accreditation it provides. This is not always true however as some companies will apply their same academic cut-offs for generic roles (with little investigation after this) even for highly niche actuarial roles (for example the big four).

Some companies will also expect students to be from a university with a high reputation. Investment banks in particular are known to do this. Curtin's reputation will vary by company, with those situated in Perth far more likely to view Curtin in high regard than companies that reside interstate.

On applying for opportunities interstate

While many Curtin actuarial students end up working in Perth, some will inevitably wind up in the eastern states where more opportunities for actuarial work exist. Sydney and Melbourne are where many a head office is located in Australia and therefore where the majority of traditional work in financial services is delivered.

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[10] Curtin University is fairly unique in calling it a course weighted average (CWA). Most other universities (in particular those in the eastern states) that use a similar system (i.e. a percentage grade rather than a GPA) will call is a weighted average mark (WAM). Keep in mind that they are exactly the same thing so if you are ever asked for your "WAM", just give them your CWA.

If you decide to apply for roles interstate be mindful of the logistics of potential interviews and assessment centres. Some companies will accommodate the fact the you are in Perth by offering you a interview via video call (e.g. Skype) instead. However, other companies will expect you to fly out to attend their assessment centre or interview in their office like all the other candidates. This is both time and money intensive as most companies will not pay for your flights and accommodation and it will likely be in the middle of the university semester.

There are distinct benefits to working in the eastern states over Perth however as there are far more companies there (particularly in Sydney and Melbourne). Many former Curtin actuarial students working over east end up in actuarial roles. In fact of the Curtin students in actuarial roles, it is highly likely that the majority of them are in Sydney or Melbourne. The actuarial community in Sydney and Melbourne is far larger, meaning you can build a far greater network there. Additionally, if you want to avoid the resources industry, getting out of Perth might be your best option.

Skills and personal development

The actuarial profession is one where career-long learning is built into the very fabric of membership. It is important that you continue to grow your skill base beyond formal study to remain up to date.

Technical skills

Programming languages

Programming is increasingly becoming a major part of the work that actuarial graduates perform. Gone are the days of actuaries and actuarial students doing everything in Excel. Some employers may have the highly dated impression that "all actuarial students know is Excel and a bit of VBA". It is therefore important to market your ability to code when applying for technical roles, particularly those in data science. We shouldn't claim to be on par with computer scientists, but our skills still cannot be ignored.

Below we summarise some programming languages that are commonly used in industry. Many of them can be learned at an introductory level at Curtin but mastering them is likely to require considerable additional work.

Note that, where a list of units is provided below, it will not necessarily be an exhaustive list. Those who are on the actuarial science handbooks (either as core units or optional units) will be in **bold**. Any unit that is not bold may be taken as either an elective unit (only for actuarial and applied statistics major) or negotiated as an alternative to an optional unit with the course coordinator.

R

Uses	Statistics
	Data science
Pricing	Free
Open Source?	Yes
Prominent Industries	Research
	Companies that do data science
Units at Curtin that use it	STAT1005 **Introduction to Probability and Data Analysis** (replacing STAT1001 and STAT1002 in 2020)
	STAT1006 **Regression and Nonparametric Inference** (replacing STAT1000)
	STAT2003 Analytics for Experimental and Simulated Data
	STAT2004 Analytics for Observational Data
	STAT3001 Statistical Modelling
	MATH3005 **Survival Analysis** (will be replaced by MATH3008 Survival Models & Analysis in 2022)

ACTL4003 Predictive Analytics Principles

STAT1003 Introduction to Data Science

STAT2005 Computer Simulation

STAT3009 Risk Analysis (coming in 2022)

All the units at Curtin that use R, do so incidentally while learning other things (usually topics in statistics). They don't tend to teach it as a programming language in its own right and this can lead some students to see it as a glorified graphical calculator. In reality, it is far more powerful than that.

To learn R as its own thing, rather than a learning tool, you need to need to do some extra work outside of the prescribed university curriculum. You may be fortunate enough to learn it as part of some sort of internship for example but more generally you will need to engage in self-learning.

Learning about the philosophy behind R as a language can be helpful as it is quite different to other languages such as Python. R has something of a reputation for being slow (which it certainly is, when compared to high-performing languages such as C) but you can make your code run much faster if you understand its philosophy. The first thing to understand with R is that most operations are based on vectors, so "vectorizing" your operations is usually optimal. Using for-loops in R is considered bad practice in most situations, it is typically better to perform iterative operations in a "functional" way by using either the `*apply` family of functions in base R or the `map*` family of functions in the `purrr` package (a member of the tidyverse mentioned below).

A part of R that is very worthwhile investing some time into is a collection of packages known as the 'tidyverse' for working with data (from tidying to transformation to visualisation). They were developed by Hadley Wickham (and others), who is a famous name in R development you ought to remember. Not only are the individual packages in the `tidyverse` extremely useful but they also complement each other seamlessly and come with a general philosophy and framework for working with data which is very powerful. The best way to learn about the `tidyverse` is from the creator himself, Hadley Wickham who is a fantastic communicator. Some of the ways you can learn from him include:

- » Reading and following along with his excellent book R for Data Science.
- » Reading the package documentation for each of the packages that make up the `tidyverse`.
- » Watching some of the many videos available of him presenting on YouTube (just search for "Hadley Wickham"). An example of this is the following two-part tutorial on the package `dplyr` (a member of the tidyverse):
  - ↳ https://www.youtube.com/watch?v=8SGif63VW6E
  - ↳ https://www.youtube.com/watch?v=Ue08LVuk790

You may gain a small amount of incidental exposure to the tidyverse in units at Curtin, but you are unlikely to learn its attached philosophy or get a full grasp of all the packages. Learning it properly with its attached philosophy does require personal effort but it will certainly pay off. Using the tidyverse your honours or industrial project (if you are doing honours or the applied statistics third year stream) could be a good way to start learning. You will certainly see reward for the effort you put into learning this.

One thing to keep in mind if you choose to learn about the tidyverse is to also know about base R and other R packages as well. As much as the tidyverse might suggest it is an enclosed "universe" of functions that should be used only their own, there are many extremely helpful aspects of base R, as well as other packages outside of the tidyverse that you should be aware of and utilise.

Python

Uses	Data science
	Web development
	General purpose
Pricing	Free
Open Source?	Yes
Prominent Industries	Mining

	Companies that do data science
Units at Curtin that use it	**COMP1005 Fundamentals of Programming**
	COMP1003 Data Structures and Algorithms
	STAT2005 Computer Simulation
	COMP3009 Data Mining

There is something of a two-horse race in data science between R and Python (although there are other languages that are used as well). Both are excellent tools for data science, and each have their own advantages. Typically, those of a computer science inclination will prefer Python and those with more of a statistical inclination will prefer R.

Python can be picked up and subsequently extended upon in a number of units at Curtin. These units are typically part of the Data Science degree but can be picked up as electives by actuarial students. COMP1005 Fundamentals of Programming should be completed first. It is a prerequisite for all the other units that use Python and provides foundational knowledge.

An advantage of Python is that is can be used for a great many applications which means if you want to learn it with a personal project, you have many options.

SQL (Structured Query Language)

Uses	Databases
Pricing	Many different "flavours", some of which are free
Open Source?	No
Prominent Industries	Most companies will use some flavour of SQL for their databases
Units at Curtin that use it	ISYS1001 Database Systems

In spite of the fact that very few learn it at university, many actuarial students end up using SQL in their careers. Some are fortunate enough to get exposure to it during internships. It is one of these skills that every data scientist will inevitably have to pick up.

If you can manage to fit it into your study plan as an optional (negotiated) or elective unit, ISYS1001 Database Systems is a unit worth taking (keep in mind that COMP1005 Fundamentals of Programming is a prerequisite however).

SAS (Statistical Analysis System)

Uses	Databases, statistics
Pricing	Paid (educational licences are available if you want to try it)
Open Source?	No
Prominent Industries	banking
	general insurance
Units at Curtin that use it	N/A (STAT3003 Applied Statistics used to use it but then it was replaced by R and now the unit is no longer offered)

This is an older proprietary software that is used by many firms in the financial sector. If you work in banking, general insurance or consulting companies that consult to these industries, you will likely be required to learn it in the job.

Note that many firms are attempting to move away from SAS and replace it with R and Python but this process will not happen overnight. SAS comes with customer support and a consistency (e.g. R and Python packages could be written by anyone and therefore have some level of inconsistency associated with them) that is not necessarily offered by free software such as R and Python. There also may be a resistance to change due to the cost of changing systems over and training staff in different software.

VBA (Visual Basic for Applications)

Uses	Macros and userforms within the Microsoft office suite (Excel in particular)
Pricing	Comes with Microsoft Office
Open Source?	No
Prominent Industries	Insurance
	Consulting
Units at Curtin that use it	**MATH2005 Mathematical Financial Modelling** (this unit may be removed in future)
	ACTL1000 Principles of Actuarial Science (no longer offered)

VBA is used by a number of firms to automate certain processes and to create userforms. Do not underestimate the power of knowing VBA, even if it isn't as sophisticated as other languages.

Curtin students will learn it in the units mentioned above but it may (depending on the year) also come up in assignments for the following units:

- » MATH2004 Theory of Interest
- » MATH3007 Life Contingencies 2
- » ACTL4000 Actuarial Control Cycle 1
- » ACTL4001 Actuarial Control Cycle 2

While you will not be actively taught how to use VBA in these units, learning by doing a project is often a great way to pick up useful skills.

Julia

Uses	Data science
	Numerical calculations
	General purpose
Pricing	Free
Open Source?	Yes
Prominent Industries	Companies that do data science (small)
Units at Curtin that use it	Nil

Julia is a language that was designed for numerical calculation but also useful for much more which makes it excellent for data science. Julia is a more uncommon language that is beginning to gain prominence in the world of data science. Unfortunately, it is not taught at Curtin but this also makes it and interesting point of difference on your resume if you go to the trouble of learning it compared to R and Python which are highly prevalent skills among students.

Julia in many ways makes up for the deficiencies of R and Python by being much faster (with speed on par with or approaching that of C), while also retaining the readability of the aforementioned languages. It also has the ability to include packages from R, Python, C, FORTRAN and more. Julia is however not in common use, so some companies may not see it as a useful skill. As it is on the rise however, you may see mentioned as desirable in job adverts for niche data science roles.

Other languages

The languages mentioned above are far from an exhaustive list given hundreds exist. They are however the main ones that appear in actuarial, data science and other relevant roles. This being said, it can't hurt to learn something different.

Some actuarial students will learn the (rather archaic) FORTRAN language if they that MATH2015 Mathematical Computing as an optional unit. It is a language for numerical computation that dates back to the 1950s. It was used by NASA to assist with the moon landing. Now we are in the 21st century, you are

unlikely to cross paths with FORTRAN in industry but it does still see some practical use in supercomputing.

C and Java (among others) are widely popular languages in software development and could be useful to learn for some students who are really interested computer science. They are generally much faster than the languages mentioned above but don't have the specifically-designed tools that make R and Python for example so powerful.

HTML, CSS and JavaScript (amongst) are used for web development. HTML is a mark-up language that dictates structure of webpages, CSS adds some additional cosmetics on top of that (e.g. colour) and JavaScript is a scripting language can (amongst other things) be used to make webpages more dynamic. Of course, actuarial graduates aren't typically involved in web development in the job they wind up in.

It can be useful to pick some HTML up in particular as you can combine some very basic HTML knowledge with an R or Python packages (RVest and BeautifulSoup respectively) to do something called "web scraping": exploiting the structure of a website in order to extract data from it. This can be useful way of obtaining data that you could use as a data scientist.

Software

Microsoft Excel

Uses	Spreadsheeting
	Forms
Pricing	Part of the MS Office Suite
Open Source?	No
Prominent Industries	You will struggle to find a firm that doesn't use Excel for something
Units at Curtin that use it	**MATH2005 Practical Mathematical Financial Modelling** (this unit may be removed in future as it does not appear on the 2020 handbook)
	ACTL1003 Introductory Actuarial Practices
	ACTL1000 Principles of Actuarial Science (no longer offered)

Excel is one of those skills that most workplaces will require applicants to have. And actuaries have a reputation for being "Excel wizards".

At Curtin, actuarial science students the opportunity to learn Excel in several units. To truly master Excel however, you need to do additional work. Using it for personal projects, attending skills-based workshops, work experience and even certain extracurriculars (for example the student actuarial society committee does some spreadsheeting) are all ways in which you can further hone your excel skills.

Excel is a vast (some would even say bloated) program, you will have to use it a lot before you stop learning new things. There is a potential for arrogance as an actuarial student to think they know everything there is to know but this is unlikely to be the case.

Tableau

Uses	Dashboarding
Pricing	Paid (free trial education licences available)
Open Source?	No
Prominent Industries	Consulting
Units at Curtin that use it	ACCT5034 Analysis and Visualisation of Financial Data (as this is a postgraduate level unit, most actuarial students will be ineligible to take it)

Dashboarding is a favoured approach for many consulting companies to present findings of data analysis. Tableau is fairly intuitive and can be learned on the job, some will experience it in their internships.

Tableau has a drag-and-drop interface which makes it very helpful for non-technical people (hence why consultants like to use it for communicating with clients). There is a very limited "language" embedded within it for creating calculated fields.

Microsoft Access

Uses	Databases
Pricing	Part of the MS Office Suite
Open Source?	No
Prominent Industries	Some firms use it for databases, but it is less prominent than it once was.
Units at Curtin that use it	MATH2005 Mathematical Financial Modelling (this unit may be removed in future as it does not appear on the 2020 handbook; the MS Access topic has also been removed as of 2019)

MS Access comes up for some students in their careers.

Soft skills

Presentation skills

Public speaking is a vital part of many careers. For many people, it is a daunting task to get up in front of people and talk. The key to overcoming this is often exposure, if you frequently practice it, the nerves you feel can often be replaced by a feeling of excitement instead.

Creating a presentation slides that add value by being both uncluttered but also informative is another important part of document preparation. It is often the case that simpler is better, unless you are careful, creative flourishes may serve only to distract the viewer of your presentation.

Customer service

Many opportunities, particularly graduate programs, will appreciate having some sort of customer service experience as you might be working with clients. We strongly recommend you take up a role at some point during your degree (especially if you have not before).

Additional Resources

There a number of great sources of information out there that many students may not be aware of. We hope that this document satisfies many of your needs, but we are trying as much as possible to avoid providing information that is readily available elsewhere. In some cases, information elsewhere is in an unpalatable format or incomplete and that is how we draw the line on what should be included in this document. With all this is mind, below we have collated a list of sources of information relating to units at Curtin and actuarial science in general.

Online Media

Smartphone apps

Outlook app: https://products.office.com/en-us/outlook-mobile-for-android-and-ios

This is probably the best way to check your university email. Not only do you get notifications, but it also has the benefit that you can click on it once and it will mark as read rather than having to click it several times, which is what happens when you access them through OASIS.

Lost on campus: https://studentvip.com.au/lost-on-campus

Probably the easiest way to find your way around the Curtin campus (and the campuses of many other Australian universities as well). Note that you need to create a free Student VIP account to login.

Elsie: https://campaign.curtin.edu.au/elsie-app/

This is a great organisational app that automatically populates your university timetable and units. The map on Elsie has recently been improved and some may prefer it to Lost On Campus, it is worth checking out. The app also allows you to obtain information about your results and graduation status earlier than usual which we outline below.

The "progress" section can also be used to view your updates course weighted average a few days earlier than the official release date and hence reverse engineer your semester weighted average (but not individual marks for units).

If you anticipate that you will graduate in the current semester, you can tell that you have successfully graduated if you can no longer login to the Elsie app. This will usually happen approximately a week out from the official results release date. You can also double check this by seeing if the '@student.curtin.edu.au' in your email is replaced by '@graduate.curtin.edu.au' where you search your own name in the outlook 'To' box when you start a 'new message'.

Blackboard: https://www.blackboard.com/mobile-learning/blackboard-app.html

A convenient way to access blackboard via your phone. A nice feature is the ability to save content for availability offline.

Echo360: Apple, Android

View iLectures on your phone (download for offline viewing is available). Note that you need to use student number version of email to login.

Student Actuarial Society

Website: https://www.curtinactuary.com/
Facebook group (click Join Group): https://www.facebook.com/groups/sascurtin/
Facebook page (click like or follow): https://www.facebook.com/SASCurtin/

As someone who has access to this document, we would assume you know about us in some way but following us on all our channels can be very useful.

We use our website to provide general information about Actuarial Science at Curtin, post work experience opportunities and host registration forms for events. Our Facebook group is a place for our members to communicate with each other, share information about job opportunities and promote events. On the Facebook page, we answer direct questions from our members, post photos and host events.

Actuarial YouTube Channels

In this modern age of technology students have the opportunity to employ a wide range of resources to foster their learning. One of these resources is of course YouTube but the quality of content there varies significantly. Described below are some YouTube channels that may be of interest to you as an actuarial science student.

MJ the Fellow Actuary (formally known as *MJ the Student Actuary*): https://www.youtube.com/channel/UCOds8nlJ6Ony9ZIHOY7u2Cg

Michael Jordan is an actuary from South Africa who makes videos about actuarial science and the actuarial profession, doing so as he has progressed through his own actuarial education pathway. He recently (as of 2019) completed his fellowship and it was on this esteemed occasion that he changed the name of his channel. As is the case in Australia, South Africa adhere to the actuarial curriculum prescribed by the Institute and Faculty of Actuaries in the UK, so his playlists on various CT subjects may be of particular use to students at Curtin.

Fun fact: MJ attended Wits University where he was lectured by none other than current actuarial lecturer at Curtin, Mark Hayes.

EllelleActuary: https://www.youtube.com/channel/UCvN_MUDrIFJOQAVT1UhkPEw/videos

Michelle is an Actuary from Canada. Her content focuses on her journey to becoming an actuarial fellow (which she achieved in 2017). Her videos would be of interest to anyone who is seeking someone's personal experience about what being an actuary is like. She started out by uploading some actuary-related content to her vlogging channel but has since established a dedicated actuarial channel.

Reddit: r/actuary

https://www.reddit.com/r/actuary/

This subreddit is mainly focussed on the American system but can provide some handy information (and also some other more amusing content) that Australian students can still benefit from.

Online articles

Towards Data Science (Medium): https://towardsdatascience.com/

Towards data science provides a number of interesting articles written by data science practitioners. Following this website can help students stay in the loop with all the latest developments in the ever-evolving world of data science.

Carreers websites

Glassdoor: https://www.glassdoor.com.au/Reviews/index.htm

Seek: https://www.seek.com.au/

GradConnection: https://au.gradconnection.com/

All of the sources above are very useful when looking for internships/vacation work and graduate positions. Glassdoor is particularly focussed on sharing salary information about particular companies. Seek and GradConnection provide job listings. GradConection is specifically focussed on vac work and grad roles for university students.

Other sources of job information include:

» The Student Actuarial Society website and social media are also places where we share opportunities that are specifically relevant to actuarial science students at Curtin.
» Towards the end of this document, we have a specific section on careers that can give you a feel for the industries and skills that are important for actuarial students.
» Curtin UniHub (available at https://careerhub.curtin.edu.au/) lists job opportunities much like Seek and GradConnection, some of which are not heavily advertised elsewhere.
» Lecturers often share opportunities on the Curtin Mathematics and Statistics Blackboard organisation that all Actuarial students are automatically a part of.
» LinkedIn is another place where jobs are often posted.

Curtin Course Handbooks

First two years: http://handbook.curtin.edu.au/courses/31/319306.html
Third Year Actuarial Science stream: http://handbook.curtin.edu.au/courses/31/319191.html
Third Year Actuarial and Applied Statistics stream:
http://handbook.curtin.edu.au/courses/31/319192.html
Honours: http://handbook.curtin.edu.au/courses/31/319305.html
Masters: http://handbook.curtin.edu.au/courses/31/319304.html

The Actuarial Science Handbook provides details of the course structure of the degree. Please note however, that alternative study plans exist upon negotiation with the Program Coordinator (currently Jo-Anne Morgan). Many units only run in one semester and as a result, students who commence their actuarial degree in semester 2 will inevitably depart from the study plan indicated in the course handbook

Published Unit Outlines

Download past unit outlines (requires Curtin student login):
https://ctl.curtin.edu.au/teaching_learning_services/unit_outline_builder/search_published_UO.cfm

Curtin provides a database of past unit outlines; all you need to do is enter your Curtin ID and password. This could be useful for finding information about what to expect in a unit you will take in the future. Of course, in this document we also help with this in our unit guides.

You can also check if the lecturer of a unit you currently take has changed, which will help with determining the relevant of information in the SAS guide.

The website can be slow to complete your search, be patient. Tips for improving your search results:

Narrow your search by:

» Searching for a specific unit code.
» Searching for a specific study period or year.
» Searching for a specific "area".
  ↳ When searching for a specific area keep in mind that due to a recent reshuffling of departments, most actuarial units that fell under the Department of Mathematics and Statistics in semester 1 of 2018 and prior now fall under the School of Elec Eng, Comp and Math Sci (EECMS) in semester 2 2018 and beyond.

Past Evaluate Reports

https://evaluate.curtin.edu.au/student/unit_search.cfm

You are probably familiar with the Evaluate surveys you are asked to fill out every semester. What you may not know is that you can search for past evaluate reports for units you might take in the future in order to gauge what the unit might be like. Again, in this document we also provide similar information in our unit guides.

Much like the corresponding website for unit outlines, the website can be slow to complete your search, so be patient. Tips for improving your search results:

- » Narrow your search by:
    - ↳ Searching for a specific unit code.
    - ↳ Searching for a specific study period or year.
    - ↳ Searching for a specific "area".
- » When searching for a specific area keep in mind that due to a recent reshuffling of departments, most actuarial units that previously fell under the Department of Mathematics and statistics in semester 1 of 2018 and prior now fall under the School of Elec Eng, Comp and Math Sci (EECMS) in semester 2 2018 and beyond.

Library Catalogue Search

https://catalogue.curtin.edu.au (can also be accessed via Oasis My Library)

On the library catalogue you can search for textbooks and past exams. Some textbooks are provided as a downloadable online resource for free or failing that, many can be borrowed from the library. This can be useful if you want to have a look at the textbook but do not think it is worth actually purchasing. Unfortunately, the library does not stock CT notes.

Past exams can be searched for on the library catalogue. Simply search for the unit name (for example Statistical Probability) and filter it by past exams. The number of past exams that are posted vary but you can expect at least one and most likely several past exams to be posted for almost every unit. Also keep in mind unit name changes as some past exams may be posted under their previous unit name (the unit guides below indicate any recent name changes to units).

Respected research material can also be found on this website too. While the broader internet is a great source, using the library catalogue and databases can be a way of ensuring quality sources of information. Journals often require you to purchase them in order to access articles. Should you find an article online that is pertinent to your research but is also behind a paywall, you will often be able to bypass this by searching through the library catalogue. As an example, the *North American Actuarial Journal* is made available through one of the library's databases. The library's abundance of resources for research are particularly useful for research projects.

Plan Your Timetable

http://timetable.student.curtin.edu.au/criteriaEntry.jsf

Plan your timetable can also be accessed via OASIS My Studies. If accessed via OASIS, it will automatically fill in the units you are enrolled in for the current semester.

Curtin's Plan Your Timetable database is a way of unofficially planning your timetable outside of the "My Classes" tab in eStudent. Plan Your Timetable tends to show the next semester's timetable several weeks before you can actually enrol in classes. It is capable of showing units you are not currently enrolled in making comparison of timetables based on different choices of options units possible. You can also see the exact number of places and students currently enrolled in each class.

Note that you will still need to officially register for classes via My Classes. Plan Your Timetable simply provides additional information which you can use to make decisions.

Actuarial Organisations

Actuaries Institute Website (Australia): https://www.actuaries.asn.au/

The Actuaries Institute is Australia's professional body for the actuarial profession. The Actuaries Institute website provides up-to-date news and information regarding actuarial accreditation in Australia.

The Actuaries Institute has an agreement with a number of other actuarial organisations across the world to recognise the accreditation of other actuaries from certain countries. As a part of this arrangement, a number of countries, including Australia, adhere to the curriculum prescribed by the UK equivalent, Institute and Faculty of Actuaries.

Institute and Faculty of Actuaries (UK): https://www.actuaries.org.uk/

One may obtain past institute exam papers from this website as well as further information about the curriculum. Third year students should find this a useful resource as the Curtin exams they take will mirror those held by the Institute.

See below, our Curtin unit to Institute subject mappings reference table.

Appendix

A Brief History of the SAS Guide

This document has been a long time in the making. Our 2018 IT officers were inspired to create it based on viewing the websites of various actuarial societies across Australia for the purpose of improving the website of their own (or rather Curtin's) actuarial society. Whilst doing so they continued to stumble upon documents similar to this one, which described units taken by actuarial students at their universities. The inaugural edition of the guide was published prior to the commencement of semester 1 2019. It was downloaded over 100 times throughout the semester. We at the Student Actuarial Society hope to see this success continue into the future.

In the summer of 2019/20, a team of SAS committee members undertook a serious overhaul of the entire document. Significant improvements to the formatting of the document were made and a new careers section was added.

We would like to acknowledge the efforts of everyone who has made a contribution to this document. The relevance and utility of our unit guides in particular, rely heavily upon your input.

Future additions to the guide

This guide as a work in progress, you may have noticed that many of the unit guides are incomplete for example (as we are yet to receive a review for them). If you have any suggestions for improvements, please let us know by either reaching out to a SAS representative, or by contributing in the top right hand corner.

In addition to updating and improving on the current contents of this document, it is our intention to add more sections to it as well.

Planned future changes to this document include:

» Updating information on actuarial accreditation under the new system as it becomes clearer.
» Addition of information for July intake/part time students' study load/structure.
» Continual updates on the new careers section.
» Updating information on new units that have previously not been taken and removing units from the guide as they become irrelevant.