ACTL5301
Models for Risk Management

Course Outline
Semester 1, 2016

Part A: Course-Specific Information

Please consult Part B for key information on Business School policies (including those on plagiarism and special consideration), student responsibilities and student support services.
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PART A: COURSE-SPECIFIC INFORMATION

1 STAFF CONTACT DETAILS
The Course Coordinator and Lecturer in Charge is Associate Professor Bernard Wong:

<table>
<thead>
<tr>
<th>Staff</th>
<th>E-mail</th>
<th>Room</th>
<th>Telephone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Associate Professor Bernard Wong</td>
<td><a href="mailto:bernard.wong@unsw.edu.au">bernard.wong@unsw.edu.au</a></td>
<td>Business School 641</td>
<td>9385 2827</td>
</tr>
</tbody>
</table>

He is responsible for course administration, teaching and final assessment of the course. His consultation times during the semester will be posted (and updated) on the course website.

2 COURSE DETAILS

2.1 Teaching Times and Locations
Lectures
Lectures will be held on Fridays from 6pm to 9pm in the Business School Building Room 232 from week 1 to week 12 (excluding public holidays).

Timetables and locations are correct at time of editing. A full timetable of lectures and topics is provided later in this Course study guide. Any alterations to the lecture times or locations will be advised in lectures and via the Course website.

2.2 Units of Credit
The course is worth 6 units of credit. There is no parallel teaching in this course.

2.3 Summary of Course
This course explores quantitative methods of risk measurement and modelling in financial institutions, including insurers, reinsurers, superannuation funds, and banks, and the major types of risks encountered therein.

Topics covered include: risk measures; multivariate models for risks; copulas and dependence models; extreme value theory and tails of losses; time series techniques. The links between the different modelling tools are explored, and are further illustrated with models used in different risk types. Together with ACTL5302 it is designed to cover the course topics for the professional actuarial Enterprise Risk Management/ CERA qualification. Students completing the courses ACTL5301 and ACTL5302\(^1\) at a Distinction average will be recommended for exemption for the Actuaries Institute Part III Examination C7A on Enterprise Risk Management.

2.4 Course Aims and Relationship to Other Courses
The aims of this course are to provide students with an understanding of:

- The main techniques used to develop and estimate distributions used in risk management for insurance, market, credit and operational risk.
- Risk models for individual risks and aggregate risks in a portfolio.
- The main features of market, credit and operational risk models and their links to insurance risk modelling.

\(^1\) Slightly different transition arrangements may apply to students who completed one (or both) of these courses in earlier years.
• Alternative approaches to modelling dependencies in risk management, the main features of copulas and applications of copulas to model a portfolio of dependent risks.
• The main features and risk management applications of extreme value distributions.
• Current research issues in quantitative risk models and their practical applications.

This course is offered as an elective in the postgraduate program (Master of Actuarial Studies, Master of Risk Management) in the school of risk and actuarial studies.

Students are assumed to have a good mathematics background and a solid understanding of the concepts of probability and statistics and risk models as covered in ACTL5101 Probability and Statistics for Actuaries and ACTL5106 Insurance Risk Models. These courses are the formal prerequisites for ACTL5301. In addition, students will also benefit from having been exposed to topics in financial economics such as discussed in ACTL5109 Financial Economics for Insurance and Superannuation.

Students need to be able to use a word processing package (such as WORD) and a spreadsheet (such as EXCEL). They should also be familiar with a statistical software package such as R which can be used to implement many of the models discussed in this course.

2.5 Student Learning Outcomes
At the end of the course, you should be able to:

• Understand aspects of the theory and practice of quantitative risk modelling for insurance and financial risks as covered in the course aims. [LO1]
• Assess models used for risk management in practice and their advantages and shortcomings. [LO2]
• Estimate and apply various models for practical applications. [LO3]
• Review and analyse more advanced risk models. [LO4]
• Identify and evaluate relevant research literature on current developments in quantitative risk modelling. [LO5]
• Use effective presentation, discussion and report writing skills for explaining risk-modelling concepts used in quantitative risk management. [LO6]

UNSW Business School Program Learning Goals
The Course Learning Outcomes are what you should be able to DO by the end of this course if you participate fully in learning activities and successfully complete the assessment items.

The Learning Outcomes in this course also help you to achieve some of the overall Program Learning Goals and Outcomes for all postgraduate coursework students in the Business School. Program Learning Goals are what we want you to BE or HAVE by the time you successfully complete your degree (e.g. ‘be an effective team player’). You demonstrate this by achieving specific Program Learning Outcomes - what you are able to DO by the end of your degree (e.g. ‘participate collaboratively and responsibly in teams’).
**Business School Postgraduate Coursework Program Learning Goals and Outcomes**

1. **Knowledge:** Our graduates will have current disciplinary or interdisciplinary knowledge applicable in local and global contexts.  
   You should be able to identify and apply current knowledge of disciplinary or interdisciplinary theory and professional practice to business in local and global environments.

2. **Critical thinking and problem solving:** Our graduates will have critical thinking and problem solving skills applicable to business and management practice or issues.  
   You should be able to identify, research and analyse complex issues and problems in business and/or management, and propose appropriate and well-justified solutions.

3. **Communication:** Our graduates will be effective communicators in professional contexts.  
   You should be able to:  
   a. Produce written documents that communicate complex disciplinary ideas and information effectively for the intended audience and purpose, and  
   b. Produce oral presentations that communicate complex disciplinary ideas and information effectively for the intended audience and purpose.

4. **Teamwork:** Our graduates will be effective team participants.  
   You should be able to participate collaboratively and responsibly in teams, and reflect on your own teamwork, and on the team’s processes and ability to achieve outcomes.

5. **Ethical, social and environmental responsibility:** Our graduates will have a sound awareness of ethical, social, cultural and environmental implications of business issues and practice.  
   You should be able to:  
   a. Identify and assess ethical, environmental and/or sustainability considerations in business decision-making and practice, and  
   b. Consider social and cultural implications of business and /or management practice.

6. **Leadership:** Our graduates will have an understanding of effective leadership. (MBA and MBT programs only).  
   You should be able to reflect on your personal leadership experience, and on the capabilities necessary for leadership.

For more information on the Postgraduate Coursework Program Learning Goals and Outcomes, see Part B of the course outline.

<table>
<thead>
<tr>
<th>Program Learning Goals and Outcomes</th>
<th>Course Learning Outcomes</th>
<th>Course Assessment Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>This course helps you to achieve the following learning goals for all UNSW Business School postgraduate coursework students:</td>
<td>On successful completion of the course, you should be able to:</td>
<td>This learning outcome will be assessed in the following items:</td>
</tr>
<tr>
<td>1 Knowledge</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td>2 Critical thinking and problem solving</td>
<td>All</td>
<td></td>
</tr>
<tr>
<td>3a Written communication</td>
<td>All</td>
<td></td>
</tr>
</tbody>
</table>
3b Oral communication  n/a
4 Teamwork  n/a
5a. Ethical, environmental and sustainability responsibility  n/a
5b. Social and cultural awareness  n/a

3 LEARNING AND TEACHING ACTIVITIES

3.1 Approach to Learning and Teaching in the Course
The course textbooks, lectures and assessment tasks are designed to provide a framework for your learning. Every student has a different approach to learning. How much time you spend on reading in preparation for lectures, completing assessment tasks, reviewing course objectives, deepening your understanding and preparing for final examinations will depend on your learning approach. Lectures will generally cover the main concepts and issues and will not necessarily cover all the details of the course readings or texts. It is expected that you have read the reading material for the lecture in advance. Students who are successful in this course take an active approach to learning.

3.2 Learning Activities and Teaching Strategies
The learning activities of this course involve three key components – the lecture, the assignments, and your private study. Each lecture will provide a short overview of topic at hand and will then focus on explaining the difficult concepts and issues. The role of the lecture is to help you understand the context of the topic as well as work through the difficult points. To maximize your achievements in each lecture you should read the assigned notes prior to each class. The assignments present you with a practical application of course concepts to a problem in risk management (see also assessments section, below). Your private study is the most important component of this course. Weekly readings, solving problems, and your own topic summaries form the basis of an excellent private study regime. Keeping up to date is very important and each week builds on the prior weeks so it is important that you get your study regime organised quickly.

Students are not permitted to bring into the class any sound or video recording devices.

4 ASSESSMENT

4.1 Formal Requirements
In order to pass this course, you must:
- achieve a composite mark of at least 50%; and
- make a satisfactory attempt at all assessment tasks.

4.2 Assessment Details
Assessment of your performance in the course will be done through a number of tasks, whose list you will find in the following table with relevant details.

<table>
<thead>
<tr>
<th>Assessment Task</th>
<th>Weighting</th>
<th>Length</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mid Session exam</td>
<td>15%</td>
<td>1 hour</td>
<td>18:00 on 15 April, 2016</td>
</tr>
<tr>
<td>Assignment</td>
<td>25%</td>
<td></td>
<td>14:00 on 18 May, 2016</td>
</tr>
<tr>
<td>Final Examination</td>
<td>60%</td>
<td>2 hours</td>
<td>University Examination Period.</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100%</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Whilst feedback will be provided to students after their assessments have been completed, students should note that the final assessment can involve scaling of overall marks to adjust for varying difficulty across years and to adjust for variations in marking standards.

4.2 Details of each assessment task:

4.3.1 Assignment
The Assignment is intended to develop your skills in research and your ability to concisely and coherently present your ideas. It is intended to be part of achieving course learning outcomes 1-6, and postgraduate program learning goals 1-3.

There will be one major assignment task involving application of course concepts to data analysis and practical risk management decision-making. Details will be provided through the course blackboard website. The assignment will allow students the opportunity to develop their understanding of the issues involved in estimating and applying models for various risks and broaden their knowledge of course topics. They will also provide students with an opportunity to develop research skills in learning how to locate and evaluate the research literature on quantitative risk modelling. Marks will be awarded for
- Accuracy of results
- Presentation
- Reasonableness checks applied
- Technical details

The assignment questions will be posted on the course moodle website on or before 6pm, 27th April, 2016. It will be due (submitted via TURNITIN on the course website) by 2pm, 18th May, 2016.

Students are reminded that the work they submit must be their own. While we have no problem (and in fact, it is encouraged, to interact with your peers to enhance your learning) with students working together on the assignment problems, the material students submit for assessment must be their own.

Assignment submission procedure
Assignments must be submitted via the Turnitin submission box that is available on the course website. Turnitin reports on any similarities between their own cohort’s
assignments, and also with regard to other sources (such as the internet or all assignments submitted all around the world via Turnitin). More information is available at:
http://elearning.unsw.edu.au/turnitin/content/TurnItInStudentSupport.cfm?ss=0

Please read this page, as we will assume that its content is familiar to you. You will be able to make multiple submissions, with only the final (on time) submission being used for grading.

Please note that it is assignments MUST be submitted prior to the due time and date. The School of Risk and Actuarial Studies has a policy of grading late assignments with a zero mark. Punctual submission of work is required in order to satisfy the requirements of the course. Turnitin will not accept any late submission. The assignment may be marked at the discretion of the course co-ordinator if there is a valid reason for late submission and used in cases where your final overall results are marginal.

You need to check your document once it is submitted (check it on-screen). We will not mark assignments that cannot be read on screen.

Students are reminded of the risk that technical issues may delay or even prevent their submission (such as internet connection and/or computer breakdowns). Students should then consider either submitting their assignment from the university computer rooms or allow enough time (at least 24 hours is recommended) between their submission and the due time. The Turnitin module will not let you submit a late report. No paper copy will be either accepted or graded.

In case of a technical problem, the full document must be submitted to the course coordinator before the due time by e-mail, with explanations about why the student was not able to submit on time. In principle, this assignment will not be marked. It is only in exceptional circumstances where the assignment was submitted before the due time by e-mail that it may be marked—and this only if a valid reason is established.

4.3.2 Mid Session Exam

The mid session exam will assess critical analysis and problem solving skills as well as written communication skills, and correspond to course learning outcomes 1-6, and postgraduate program learning goals 1-3. In addition, the class test provides a feedback mechanism for students to gauge their progress in the course.

The date and time for the test is 15th April, 2016, and will be at the normal lecture location. The test will be administered at 6:00pm, and will be worth 15% of the total assessment for the course. The test will be closed book.

Normal examination rules apply to the conduct of class tests. Calculators will be allowed in the class tests and the final examination but a clear indication of all of the steps involved in your calculations must be shown. The University will not supply calculators to students for use in examinations where the provision of calculators has not been requested by the course examiner. It is the student's responsibility to be familiar with the rules governing the conduct of examinations.

The mid session exam require written responses, with students earning marks for correct explanations of the main concepts and issues examined in each question. Marks for calculation questions will be granted on mathematical working as well as part
marks for incorrect responses with correct method and reasoning. They test not only your knowledge of the material, but also the depth of your understanding of it.

4.3.3 Final Exam
The final examination will be a two hour written paper. The examination will aim to assess the achievement of the learning outcomes of the course including the course aims. The examination will assess critical analysis and problem solving skills as well as written communication skills, and correspond to course learning outcomes 1-6, and postgraduate program learning goals 1-3.

4.4 Late Submission
Late submission of any assessment item will not be accepted unless the requirements relating to “Special Consideration” apply (see Part B Course Outline).

Quality Assurance
The Business School is actively monitoring student learning and quality of the student experience in all its programs. A random selection of completed assessment tasks may be used for quality assurance, such as to determine the extent to which program learning goals are being achieved. The information is required for accreditation purposes, and aggregated findings will be used to inform changes aimed at improving the quality of Business School programs. All material used for such processes will be treated as confidential.

5 COURSE RESOURCES
There are many books of relevance to the course topics. The following books will be the main text references for a substantial part of the course:


Other References
Other texts that are useful references for the course coverage are:


Course Website
The course website is available from the UNSW TELT platform: 
http://elearning.unsw.edu.au/

To access the online support site for students, follow the links from that website to Support for Students. Additional technical support can be obtained from itservicecentre@unsw.edu.au (02 9385 1333).

All course contents will be available from the course website. It is essential that you visit the site regularly to see any notices posted there by the course coordinator, as it will be assumed that they are known to you within a reasonable time.

**Actuaries Institute**
The Actuaries Institute allows students to become University Subscribers free of charge. Full time undergraduates studying at an Institute accredited university who are members of a university student actuarial society are eligible.
To sign up, go to http://www.actuaries.asn.au/Membership/MembershipoftheInstitute/Subscriber.aspx

### 6 COURSE EVALUATION AND DEVELOPMENT

Each year feedback is sought from students and other stakeholders about the courses offered in the School and continual improvements are made based on this feedback.

UNSW's Course and Teaching Evaluation and Improvement (CATEI) Process is one of the ways in which student evaluative feedback is gathered. In this course we will seek feedback at least at the end of the session.

Partly as a result of feedback from previous offerings of this course, in 2016 we will fully integrate the updated materials included in the new version of the textbook, and to include additional opportunities for students to apply course concepts to practical problems utilizing more advanced software tools.
7 COURSE SCHEDULE

This timetable may be altered. Students will be advised of any changes in lectures and via the course web site.

<table>
<thead>
<tr>
<th>Week</th>
<th>Day</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4-Mar</td>
<td>Intro to Quantitative Risk Management</td>
</tr>
<tr>
<td>2</td>
<td>11-Mar</td>
<td>Risk Measures; Financial Time Series.</td>
</tr>
<tr>
<td>3</td>
<td>18-Mar</td>
<td>Multivariate Models (i)</td>
</tr>
<tr>
<td>4</td>
<td>25-Mar</td>
<td>Public Holiday</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mid Semester Break</td>
</tr>
<tr>
<td>5</td>
<td>8-Apr</td>
<td>Multivariate Models (ii)</td>
</tr>
<tr>
<td>6</td>
<td>15-Apr</td>
<td>Multivariate Models (iii); Mid-Semester Exam</td>
</tr>
<tr>
<td>7</td>
<td>22-Apr</td>
<td>Copulas and Dependence (i)</td>
</tr>
<tr>
<td>8</td>
<td>29-Apr</td>
<td>Copulas and Dependence (ii)</td>
</tr>
<tr>
<td>9</td>
<td>6-May</td>
<td>Extreme Value Theory</td>
</tr>
<tr>
<td>10</td>
<td>13-May</td>
<td>Market. Credit, and Operational Risk Analytics (i)</td>
</tr>
<tr>
<td>11</td>
<td>20-May</td>
<td>Market. Credit, and Operational Risk Analytics (ii)</td>
</tr>
<tr>
<td>12</td>
<td>27-May</td>
<td>Market. Credit, and Operational Risk Analytics (iii)</td>
</tr>
</tbody>
</table>