# MGMT320
## Advanced Analytics Techniques

S1 Day 2016

*Dept of Marketing and Management*

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**General Information**

<table>
<thead>
<tr>
<th>Unit convenor and teaching staff</th>
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<tbody>
<tr>
<td>Lecturer</td>
</tr>
<tr>
<td>Aschwin Beurskens</td>
</tr>
<tr>
<td><a href="mailto:aschwin.beurskens@mq.edu.au">aschwin.beurskens@mq.edu.au</a></td>
</tr>
<tr>
<td>Contact via eMail</td>
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<tr>
<td>Monday 9:00pm-10pm or by appointment</td>
</tr>
<tr>
<td>Hume Winzar</td>
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<tr>
<td><a href="mailto:hume.winzar@mq.edu.au">hume.winzar@mq.edu.au</a></td>
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<td>Aschwin Beurskens</td>
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<td><a href="mailto:aschwin.beurskens@mq.edu.au">aschwin.beurskens@mq.edu.au</a></td>
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<table>
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<tr>
<th>Credit points</th>
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<tr>
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<table>
<thead>
<tr>
<th>Prerequisites</th>
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<tbody>
<tr>
<td>39cp including (STAT270 and MGMT220)</td>
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<tr>
<th>Corequisites</th>
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<th>Co-badged status</th>
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<table>
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<tr>
<th>Unit description</th>
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<tr>
<td>This is an advanced applied-skills unit which extends concepts and analytical techniques from earlier units. Students will access data from customer databases, security services, transport and social media to create graphical representations of data for analysis of locational maps, social networks, timelines and event flowcharts. Students will clean data in commonly-used spreadsheet formats and make extensive use of proprietary software from big-data orientated companies such as IBM, Google, Tableau and others. Students will develop skills in data visualisation that can be applied to competitive behaviour, target customer analysis, criminology and security intelligence problems.</td>
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**Important Academic Dates**
Information about important academic dates including deadlines for withdrawing from units are available at [http://students.mq.edu.au/student_admin/enrolmentguide/academicdates/](http://students.mq.edu.au/student_admin/enrolmentguide/academicdates/)

**Learning Outcomes**

1. Develop sound solutions to business problems
2. Demonstrate competence in relation to forecasting
3. Apply critical thinking to strategy in analysing firm behaviour
4. Understand contemporary challenges to business organisations

**Assessment Tasks**

<table>
<thead>
<tr>
<th>Name</th>
<th>Weighting</th>
<th>Due</th>
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</thead>
<tbody>
<tr>
<td>Data extraction task</td>
<td>20%</td>
<td>Week #3</td>
</tr>
<tr>
<td>Spatial mapping task</td>
<td>20%</td>
<td>Week #6</td>
</tr>
<tr>
<td>Social Network analysis</td>
<td>30%</td>
<td>Week #9</td>
</tr>
<tr>
<td>Group Project</td>
<td>30%</td>
<td>Week #13</td>
</tr>
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**Data extraction task**

Due: **Week #3**  
Weighting: **20%**

Data extraction, and interactive visualisation

This Assessment Task relates to the following Learning Outcomes:

- Apply critical thinking to strategy in analysing firm behaviour

**Spatial mapping task**

Due: **Week #6**  
Weighting: **20%**

Spatial mapping task. Realtime data extraction and interactive visualisation app.

Using Tableau(R) and related data extraction software, create an interactive app for interrogating geographic data.

This Assessment Task relates to the following Learning Outcomes:

- Demonstrate competence in relation to forecasting
- Apply critical thinking to strategy in analysing firm behaviour

**Social Network analysis**

Due: **Week #9**  
Weighting: **30%**

Social Network analysis. Interactive visualisation and key node identification, with explanatory notes.
This Assessment Task relates to the following Learning Outcomes:

- Develop sound solutions to business problems
- Demonstrate competence in relation to forecasting
- Understand contemporary challenges to business organisations

Group Project
Due: Week #13
Weighting: 30%

Plan for a major public event, Written report and appropriate software design as appropriate for the task.

Issues of security, media engagement, transportation, and public safety may be involved that require information systems, tracking and reporting. Maximum 2000 words.

This Assessment Task relates to the following Learning Outcomes:

- Develop sound solutions to business problems
- Apply critical thinking to strategy in analysing firm behaviour
- Understand contemporary challenges to business organisations

Delivery and Resources

Classes
Number and length of classes: 3 hours face-to-face teaching per week, consisting of 1 x 2 hour lecture and 1 x 1 hour tutorial. The timetable for classes can be found on the University web site at: http://www.timetables.mq.edu.au/

Textbook

Technology Used and Required
Students will learn to use spreadsheet (MS-Excel) and MINITAB.

Unit Web Page
The web page for this unit can be found at: iLearn http://ilearn.mq.edu.au

Teaching and Learning Strategy
This unit is lecture- and tutorial-based. Typically, the class-time structure will be like this:
• **Lectures**: We will establish links between theory and your personal knowledge from your previous units during class discussions, and then integrate these with applied exercises.

• **Tutorials**: Students are required to work on some tasks using appropriate models and techniques. Student participation and meaningful contribution are essential to understand analytics concepts and techniques.

Lecture notes will be posted before each lecture on [iLearn](http://unitguides.mq.edu.au/unit_offerings/66321/unit_guide/print).

## Unit Schedule

Time spent on individual topics and exercises may change as we progress during the semester, so some topics may vary from this schedule.

<table>
<thead>
<tr>
<th>Week #</th>
<th>Topic</th>
<th>Deadline</th>
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<tbody>
<tr>
<td>1</td>
<td>Introductions</td>
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<tr>
<td></td>
<td>Why is analytics so important to business? (chapter 4)</td>
<td></td>
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<tr>
<td></td>
<td>Define Business needs (chapter 5/8)</td>
<td></td>
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<tr>
<td></td>
<td>[AB] Exercise/game to demonstrate value</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Determine the analytic application/key audience (chapter 6)</td>
<td></td>
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<tr>
<td></td>
<td>Build the Analysis data set (chapter 8)</td>
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<tr>
<td>3</td>
<td>Build &amp; Deploy the predictive model (chapter 8)</td>
<td>Assignment #1: Timeline task</td>
</tr>
<tr>
<td>4</td>
<td>Overview Predictive Analytics Techniques (chapter 9)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Machine learning, big data, statistics</td>
<td></td>
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<tr>
<td></td>
<td>Linear Models</td>
<td></td>
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<tr>
<td>5</td>
<td>Additive models (chapter 9)</td>
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6 Neural Networks & Automated learning (chapter 9 and Appendix A)  
  ‘Watson’ & ‘Amelia’ 
  Assignment #2: Spatial Mapping

7 USE case 1: predict and explain (chapter 7, 10 & 11)

8 USE case 2: forecast and discovery (chapter 7, 10 & 11)

9 USE case 3: simulation and optimisation (chapter 7, 10 & 11)  
  Assignment #3: Social Network Analysis

10 Social Network Analysis: the case of Sept 11 Hijackers (chapter 4 Heuer)

11 Group project briefing

12 Group project consultation session

13 Assignment #4: Group Project

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central. Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy http://mq.edu.au/policy/docs/academic_honesty/policy.html


http://unitguides.mq.edu.au/unit_offerings/66321/unit_guide/print 6

In addition, a number of other policies can be found in the Learning and Teaching Category of Policy Central.

**Student Code of Conduct**

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: [https://students.mq.edu.au/support/student_conduct/](https://students.mq.edu.au/support/student_conduct/)

**Results**

Results shown in *iLearn*, or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in *eStudent*. For more information visit [ask.mq.edu.au](http://ask.mq.edu.au).

**Student Support**

Macquarie University provides a range of support services for students. For details, visit [http://students.mq.edu.au/support/](http://students.mq.edu.au/support/)

**Learning Skills**

Learning Skills ([mq.edu.au/learningskills](http://mq.edu.au/learningskills)) provides academic writing resources and study strategies to improve your marks and take control of your study.

- Workshops
- StudyWise
- Academic Integrity Module for Students
- Ask a Learning Adviser

**Student Enquiry Service**

For all student enquiries, visit Student Connect at [ask.mq.edu.au](http://ask.mq.edu.au)

**Equity Support**

Students with a disability are encouraged to contact the Disability Service who can provide appropriate help with any issues that arise during their studies.

**IT Help**

For help with University computer systems and technology, visit [http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/](http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/).

When using the University's IT, you must adhere to the Acceptable Use of IT Resources Policy. The policy applies to all who connect to the MQ network including students.
Graduate Capabilities

Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

Learning outcomes

- Develop sound solutions to business problems
- Demonstrate competence in relation to forecasting
- Apply critical thinking to strategy in analysing firm behaviour

Assessment tasks

- Spatial mapping task
- Social Network analysis
- Group Project

Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

Learning outcomes

- Demonstrate competence in relation to forecasting
- Apply critical thinking to strategy in analysing firm behaviour

Assessment tasks

- Data extraction task
- Group Project

Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and
systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

**Learning outcomes**
- Develop sound solutions to business problems
- Apply critical thinking to strategy in analysing firm behaviour
- Understand contemporary challenges to business organisations

**Assessment tasks**
- Data extraction task
- Spatial mapping task
- Social Network analysis
- Group Project

**Capable of Professional and Personal Judgement and Initiative**
We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

**Learning outcomes**
- Develop sound solutions to business problems
- Demonstrate competence in relation to forecasting
- Apply critical thinking to strategy in analysing firm behaviour
- Understand contemporary challenges to business organisations

**Assessment tasks**
- Spatial mapping task
- Social Network analysis
- Group Project

**Changes from Previous Offering**
This is our first offering of this unit. No previous offerings are available.

**Global Contexts and Sustainability**
This unit teaches Analytics that can be applied in a global context.
Sustainability issues are embedded in our discussions of equity, privacy and ethics throughout the progress of this unit.

**Research and Practice**

- This unit includes research by the unit lecturer and other Macquarie University researchers
- This unit uses research from external sources. This unit gives you opportunities to learn how to critique current research at the frontiers of your discipline as a prelude to later conducting your own research.

- International Journal of Business Analytics (IJBAN)
- International Journal of Business Analytics and Intelligence
- Database Systems Journal
- Business & Information Systems Engineering