STAT175
Gambling, Sport and Medicine
S1 Evening 2013

Statistics

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General Information

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Credit points
3

Prerequisites

Corequisites

Co-badged status

Unit description
This is a general education unit and recommended for students in all fields of study. There is no assumed knowledge. It is particularly useful for those seeking a better understanding of statistics, using attractive and relevant ideas from areas of popular interest. The unit includes analysis of popular gambling games; the chance of success is calculated along with the testing of various strategies for winning. Statistics also plays an important role in the development of sporting strategies and certain national sports are examined. The use of statistics in the important field of medical science is covered. Ethical aspects of gambling, sport and medicine are discussed.

Important Academic Dates
Information about important academic dates including deadlines for withdrawing from units are available at https://students.mq.edu.au/important-dates

Learning Outcomes

1. explain the meaning of common statistical terms that appear in gambling, sport and medicine
2. apply a range of statistical and probability techniques in these and other areas
3. use a spreadsheet and a statistical computer package to carry out statistical
investigations
4. communicate the results of your statistical investigations clearly
5. discuss the role that statistics plays in gambling, sporting performance and medical studies
6. discuss ethical problems raised by the use of statistics in gambling, sport and medicine
7. continue any future statistical studies with increased confidence

Assessment Tasks

<table>
<thead>
<tr>
<th>Name</th>
<th>Weighting</th>
<th>Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignment 1</td>
<td>10%</td>
<td>6pm Monday 8 April</td>
</tr>
<tr>
<td>Assignment 2</td>
<td>10%</td>
<td>6pm Monday 27 May</td>
</tr>
<tr>
<td>Four labs collected</td>
<td>8%</td>
<td>random</td>
</tr>
<tr>
<td>Practical Participation</td>
<td>12%</td>
<td>every week starting week 2</td>
</tr>
<tr>
<td>Final Examination</td>
<td>60%</td>
<td>University Examination Period</td>
</tr>
</tbody>
</table>

Assignment 1
Due: **6pm Monday 8 April**
Weighting: **10%**

This Assessment Task relates to the following Learning Outcomes:
- explain the meaning of common statistical terms that appear in gambling, sport and medicine
- apply a range of statistical and probability techniques in these and other areas
- communicate the results of your statistical investigations clearly
- discuss the role that statistics plays in gambling, sporting performance and medical studies
- discuss ethical problems raised by the use of statistics in gambling, sport and medicine
- continue any future statistical studies with increased confidence

Assignment 2
Due: **6pm Monday 27 May**
Weighting: **10%**

This Assessment Task relates to the following Learning Outcomes:
• apply a range of statistical and probability techniques in these and other areas
• use a spreadsheet and a statistical computer package to carry out statistical investigations
• communicate the results of your statistical investigations clearly
• discuss the role that statistics plays in gambling, sporting performance and medical studies
• continue any future statistical studies with increased confidence

Four labs collected
Due: random
Weighting: 8%
2% x 4

This Assessment Task relates to the following Learning Outcomes:
• explain the meaning of common statistical terms that appear in gambling, sport and medicine
• apply a range of statistical and probability techniques in these and other areas
• use a spreadsheet and a statistical computer package to carry out statistical investigations
• communicate the results of your statistical investigations clearly
• discuss the role that statistics plays in gambling, sporting performance and medical studies

Practical Participation
Due: every week starting week 2
Weighting: 12%
1% x 12

This Assessment Task relates to the following Learning Outcomes:
• apply a range of statistical and probability techniques in these and other areas
• use a spreadsheet and a statistical computer package to carry out statistical investigations
• communicate the results of your statistical investigations clearly
• discuss ethical problems raised by the use of statistics in gambling, sport and medicine
• continue any future statistical studies with increased confidence
Final Examination

Due: University Examination Period
Weighting: 60%

This Assessment Task relates to the following Learning Outcomes:

- explain the meaning of common statistical terms that appear in gambling, sport and medicine
- apply a range of statistical and probability techniques in these and other areas
- communicate the results of your statistical investigations clearly
- discuss the role that statistics plays in gambling, sporting performance and medical studies

Delivery and Resources

Classes

You will have one 3-hour lecture time, and you will be enrolled in one 1-hour laboratory class.

The timetable for classes can be found on the University web site at:

http://www.timetables.mq.edu.au/

Attendance at the lectures is optional but may be monitored to aid in deciding the grades of those students who are close to a grade borderline or who have requested special consideration.

Attendance at the practical is compulsory and will be monitored. Students should attend the practical they enrolled into during the enrolment period. An attendance means at least 50 minutes of attending and participating in practical exercises.

The use of mobile phone is not allowed during your practical. Your mobile phone should be put away for the duration of the practical.

The standard of some of these exercises covered in practicals is similar to that required in the examinations. Also during practicals in which the marked assignments are handed back to the students, the full solutions will be covered during the lab.

These solutions will not be available from anywhere else.

Required and Recommended Texts and/or Materials

We will be providing the beta version of a textbook, Kj Byun, Petra Graham and Peter Petocz (2012). Taking Your Chances in Gambling, Sport and Medicine for lectures and also notes for practical classes.
Some other useful background references are:


Technology Used and Required

UNIT WEB PAGE

There is an iLearn page for the unit that contains notices, lecture notes, weekly exercises, lab materials and some solutions. We will be using iLearn throughout the course.

You can access this from https://ilearn.mq.edu.au/login/MQ/. You will be asked for your Macquarie OneID username and password. If you have any problems, try one of the Help buttons.

The Department of Statistics web page for this unit can be found at: www.stat.mq.edu.au/undergraduate_programs/stat_units/stat_units100/stat175/ (you can get there conveniently from the Department website www.stat.mq.edu.au by selecting Undergraduate programs, then Statistics Units and then Stat175).

Teaching and Learning Strategy

Our role:

- In the 3-hour “lecture” class, we will present new material in the form of lectures, and include a tutorial component where you can practise the techniques and ask questions.
- In the laboratory classes, we will help you work practically, solving problems and analysing data using Microsoft Excel and Minitab.

Your role:

- We expect that you will prepare by printing and reading lecture notes in advance, attending lectures, attending practical sessions and participating in the various learning activities.
- You will work individually and in groups with your fellow students. We also expect that you will make a good attempt at the assignments and final examination.

Changes from Previous Offering

The free e-book we trialed via iLearn in the second semester 2012 is now published and will be used this semester. The lectures will follow the structure and layout of this book closely.

In addition, we are making weekly practicals compulsory activity and marks will be awadred on
students' full attendance and activity participation. The number of practical exercises collected at random will increase and an extra randomized question (not published on iLearan) to answer and submit during practical session will be added.

The solutions to assignments are only available to students by attending a practical session. These changes are made in an attempt to increase students' engagement in this planet unit where previously attendance and participation has been extremely low.

**Unit Schedule**

<table>
<thead>
<tr>
<th>Date</th>
<th>Wk</th>
<th>Title</th>
<th>Stats topics</th>
<th>Lab class</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 Feb</td>
<td>1</td>
<td>Lotto &amp; Lotteries</td>
<td>Introduction, Counting techniques</td>
<td>No lab first week</td>
</tr>
<tr>
<td>4 Mar</td>
<td>2</td>
<td>Keno</td>
<td>Describing gambling games, Probability intervals</td>
<td>1. Lotto and combinations (Excel)</td>
</tr>
<tr>
<td>11 Mar</td>
<td>3</td>
<td>Sport and binomial</td>
<td>Binomial distribution, Olympic records</td>
<td>2. Random variables and Keno (Excel) (lab 2 collected)</td>
</tr>
<tr>
<td>18 Mar</td>
<td>4</td>
<td>Sports performance</td>
<td>Normal distribution, Z-scores and comparisons</td>
<td>3. World Cup Hockey (Excel)</td>
</tr>
<tr>
<td>25 Mar</td>
<td>5</td>
<td>Health Surveys</td>
<td>Data types &amp; summaries, Comparing means</td>
<td>4. Pulse rates (Minitab)</td>
</tr>
<tr>
<td>1 Apr</td>
<td>6</td>
<td>Easter Monday Holiday</td>
<td>No lectures but practicals as usual.</td>
<td>Assignment 1 preparation</td>
</tr>
</tbody>
</table>

[https://unitguides.mq.edu.au/unit_offerings/22615/unit_guide/print](https://unitguides.mq.edu.au/unit_offerings/22615/unit_guide/print)
Learning and Teaching Activities

Lectures
presentation of new material and they include a tutorial component where students can practice the techniques and ask questions.

Practicals
practical application of solving problems and analysing data using Microsoft Excel and Minitab.

<table>
<thead>
<tr>
<th>Date</th>
<th>Week</th>
<th>Activity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 Apr</td>
<td>7</td>
<td>Medical studies</td>
<td>Types of studies Odd ratios</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5. Births and Diabetes (Minitab)</td>
</tr>
<tr>
<td>29 Apr</td>
<td>8</td>
<td>Roulette</td>
<td>House margin</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chances of being ahead</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Assignment 1 solution discussion.</td>
</tr>
<tr>
<td>6 May</td>
<td>9</td>
<td>Sport and Poisson</td>
<td>Poisson distribution</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chi-squared goodness of fit</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Assignment 2 preparation</td>
</tr>
<tr>
<td>13 May</td>
<td>10</td>
<td>Testing Independence</td>
<td>Cross tabulations</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chi-square tests</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6. Soccer Goals (Excel)</td>
</tr>
<tr>
<td>20 May</td>
<td>11</td>
<td>Sports betting</td>
<td>Odds and prices</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Bookmaking</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7. Surfing and Health (Minitab)</td>
</tr>
<tr>
<td>27 May</td>
<td>12</td>
<td>Medical testing</td>
<td>Diagnostic testing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(Ass2 due Mon)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8. Sports betting (Excel)</td>
</tr>
<tr>
<td>3 June</td>
<td>13</td>
<td>Summary and revision</td>
<td>Ass2 solution and revision.</td>
</tr>
</tbody>
</table>

Please note in practicals from week 3 through to week 12, three labs will be collected at random. The collection could differ from class to class. All labs selected to be collected must be submitted by the end of your practical.
Assignments
Learning device (as well as being assessment tasks) where students can apply the statistical
techniques and concepts learned in lectures and practicals

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://www.mq.edu.au/policy/docs/academic_honesty/policy.html
Special Consideration Policy http://www.mq.edu.au/policy/docs/special_consideration/policy.html

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

Student Support
Macquarie University provides a range of Academic Student Support Services. Details of these
services can be accessed at: http://students.mq.edu.au/support/

UniWISE provides:
• Online learning resources and academic skills workshops http://www.students.mq.edu.au/support/learning_skills/
• Personal assistance with your learning & study related questions.
• The Learning Help Desk is located in the Library foyer (level 2).
• Online and on-campus orientation events run by Mentors@Macquarie.

Student Enquiry Service
Details of these services can be accessed at http://www.student.mq.edu.au/ses/.

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
If you wish to receive IT help, we would be glad to assist you at http://informatics.mq.edu.au/help/.
Graduate Capabilities

Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

Learning outcomes

- explain the meaning of common statistical terms that appear in gambling, sport and medicine
- apply a range of statistical and probability techniques in these and other areas
- use a spreadsheet and a statistical computer package to carry out statistical investigations
- communicate the results of your statistical investigations clearly
- discuss the role that statistics plays in gambling, sporting performance and medical studies
- discuss ethical problems raised by the use of statistics in gambling, sport and medicine
- continue any future statistical studies with increased confidence

Assessment tasks

- Assignment 1
- Assignment 2
- Four labs collected
- Final Examination

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

• apply a range of statistical and probability techniques in these and other areas
• use a spreadsheet and a statistical computer package to carry out statistical investigations
• discuss the role that statistics plays in gambling, sporting performance and medical studies
• continue any future statistical studies with increased confidence

Assessment tasks

• Assignment 1
• Assignment 2
• Practical Participation
• Final Examination

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

• apply a range of statistical and probability techniques in these and other areas
• use a spreadsheet and a statistical computer package to carry out statistical investigations
• discuss the role that statistics plays in gambling, sporting performance and medical studies
• discuss ethical problems raised by the use of statistics in gambling, sport and medicine
• continue any future statistical studies with increased confidence

Assessment tasks

• Assignment 1
• Assignment 2
• Practical Participation
• Final Examination
Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

**Learning outcomes**

- apply a range of statistical and probability techniques in these and other areas
- discuss the role that statistics plays in gambling, sporting performance and medical studies

**Assessment tasks**

- Assignment 2
- Practical Participation

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**

- communicate the results of your statistical investigations clearly
- discuss the role that statistics plays in gambling, sporting performance and medical studies

**Assessment tasks**

- Assignment 1
- Assignment 2
- Four labs collected
- Final Examination

Socially and Environmentally Active and Responsible

We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.
This graduate capability is supported by:

**Learning outcome**

- discuss the role that statistics plays in gambling, sporting performance and medical studies

**Assessment tasks**

- Assignment 1
- Four labs collected
- Practical Participation
- Final Examination

**Commitment to Continuous Learning**

Our graduates will have enquiring minds and a literate curiosity which will lead them to pursue knowledge for its own sake. They will continue to pursue learning in their careers and as they participate in the world. They will be capable of reflecting on their experiences and relationships with others and the environment, learning from them, and growing - personally, professionally and socially.

This graduate capability is supported by:

**Learning outcomes**

- apply a range of statistical and probability techniques in these and other areas
- discuss the role that statistics plays in gambling, sporting performance and medical studies
- continue any future statistical studies with increased confidence

**Assessment tasks**

- Assignment 1
- Practical Participation
- Final Examination

**Engaged and Ethical Local and Global citizens**

As local citizens our graduates will be aware of indigenous perspectives and of the nation's historical context. They will be engaged with the challenges of contemporary society and with knowledge and ideas. We want our graduates to have respect for diversity, to be open-minded, sensitive to others and inclusive, and to be open to other cultures and perspectives: they should have a level of cultural literacy. Our graduates should be aware of disadvantage and social justice, and be willing to participate to help create a wiser and better society.

This graduate capability is supported by:
Learning outcome

• discuss ethical problems raised by the use of statistics in gambling, sport and medicine

Assessment tasks

• Assignment 2
• Four labs collected
• Practical Participation
• Final Examination

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

• use a spreadsheet and a statistical computer package to carry out statistical investigations
• discuss ethical problems raised by the use of statistics in gambling, sport and medicine

Assessment tasks

• Assignment 1
• Assignment 2