

Course Outline
90 – 707 K: Statistical Reasoning

12 unit course

Instructor

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Office hours: By appointment

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| Prerequisites | There are no prerequisites. However, a background in basic algebra is assumed. Students without this background will need some additional work to catch up. |
| Course description | This course provides an introduction to statistical methods and reasoning. It teaches how statistical methods can inform, and thereby improve the quality of, public policy and management decisions. |
| Learning outcomes | After studying this course, you will understand a range of statistical methods and have a foundation for more advanced studies of quantitative methods. You will learn how to conduct analyses using Excel and Minitab, and how to interpret statistical output from statistical packages. You will learn how to think critically about quantitative problems, apply statistical methods to public policy and management decisions and to intelligently discuss these matters with colleagues. |

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| Course materials and resources | <p>Main resources:</p> <ul style="list-style-type: none"> • The online Learning Management System “Canvas”: https://www.cmu.edu/canvas/ • The text book and associated materials. Details of the text book are below. Sections of the text which you must study are stated in the timetable below. Exercises, activities and Applets supplement the text, and I recommend you make good use of them. • Additional readings. Copies are provided as PDF files on CANVAS. They are compulsory readings. They are listed in the timetable below. • Regular online classes provided by the course instructor, Mondays 2:00pm to 4:50pm. Attendance is compulsory. • Online tutorials and individual assistance provided by the Teaching Assistant. Details to be advised. • Individual assistance provided by the course instructor by email or using Zoom by appointment. However, the Teaching Assistant should be contacted in the first instance. |
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| <p>Course materials and resources - continued -</p> | <p>Core text book</p> <p>McClave, Benson & Sincich, "Statistics for Business and Economics", 13th Edition, Pearson, 2018</p> <p>ISBN-13: 978-0-13-450659-3 (hard cover text) ISBN-13: 978-0-13-445699-7 (student value edition) ISBN-13: 978-0-13-444633-2 (electronic 12-month subscription)</p> <p><i>Please take careful note of the above ISBN numbers, because in Australia there is a "global edition" with a different ISBN, which is also a 13th edition, but may not be identical to the "restricted" 13th edition used for this course.</i></p> <p>It is compulsory for students to have continuous access to the text book throughout the course. To save money, students may choose to purchase an electronic subscription. Students who prefer hard-copies can also save money by choosing the "student value edition" which has the same content as the hard cover text, but is a three-hole-punched, loose-leaf version.</p> <p>The text book is available for purchase at the following URL: http://www.mypearsonstore.com/bookstore/statistics-for-business-and-economics-9780134506593/ <i>Click on Chosen Format "View all" to see hardcopy, electronic and other options</i></p> <p>Statistical software</p> <p>Statistical software "Minitab 19" is used extensively, and is provided to students by CMU. Microsoft Excel is also used, including selected statistical functions.</p> <p>For instructions on how to download software, visit https://at.australia.cmu.edu/ and click on "Study Resources". Scroll down to "Download Software".</p> <p>Note that the licence for Minitab 19 expires on 31 August 2020. Therefore, if you download the software before 1 September 2020 you will need to renew the licence.</p> <p>If you have any problems installing Minitab 19, please contact the Computing and Infrastructure staff. You will find their contact details by visiting https://at.australia.cmu.edu/ and select "Staff and Faculty".</p> <p>If you have any problems using the software or understanding the output, please contact the Teaching Assistant. (Contact details to be provided.)</p> |
| <p>Online class expectations</p> | <p>Attendance at every class is compulsory.</p> <p>Video cameras must be switched on throughout the classroom session.</p> <p>Please make copious use of the Zoom Chat facility but keep on topic. Students may ask and respond to questions and have brief discussions with each other to the extent that it is helpful and without distraction. I will keep an eye on the chat screen and respond as I can.</p> <p>Please make copious use of the microphone. In general, raise your hand first (using the Zoom facility) and wait for me to ask you to speak. If you are not speaking, mute your microphone.</p> <p>Occasionally you will be allocated to "Breakout rooms", which are separate Zoom sessions with a small subgroup of the class. This will occur, for example, during the Group Discussions. Protocols and expectations will be explained at the time.</p> |

| Assessment | Assessment component | Contribution to final grade | | | | | | | | | | | | | | | | | | |
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| | Group discussions × 3 Group Discussion 1 is not assessed. Discussions 2 and 3 each contribute 5% towards the final grade. For details refer to separate document “Group Discussions - General Instructions and Assessment.PDF”. | 10% | | | | | | | | | | | | | | | | | | |
| | Tests x 2 Each test contributes 25% towards the final grade. Refer to General Instructions below. | 50% | | | | | | | | | | | | | | | | | | |
| | Final Exam | 40% | | | | | | | | | | | | | | | | | | |
| | TESTS – General Instructions The tests will be provided on CANVAS and must be completed under strict online examination conditions. I will provide more details closer to the date. The tests must be done online, without any assistance. Breaches of the requirements are extremely serious and will result in disciplinary action in accordance with CMU policies. | | | | | | | | | | | | | | | | | | | |
| Grading | <table><tr><td>A+</td><td>95% - 100%</td><td>B+</td><td>80% - < 85%</td><td>C+</td><td>68% - < 72%</td></tr><tr><td>A</td><td>90% - < 95%</td><td>B</td><td>76% - < 80%</td><td>C</td><td>64% - < 68%</td></tr><tr><td>A-</td><td>85% - < 90%</td><td>B-</td><td>72% - < 76%</td><td>C-</td><td>60% - < 64%</td></tr></table> <p>Scores below 60% are a fail grade (R)</p> | | A+ | 95% - 100% | B+ | 80% - < 85% | C+ | 68% - < 72% | A | 90% - < 95% | B | 76% - < 80% | C | 64% - < 68% | A- | 85% - < 90% | B- | 72% - < 76% | C- | 60% - < 64% |
| A+ | 95% - 100% | B+ | 80% - < 85% | C+ | 68% - < 72% | | | | | | | | | | | | | | | |
| A | 90% - < 95% | B | 76% - < 80% | C | 64% - < 68% | | | | | | | | | | | | | | | |
| A- | 85% - < 90% | B- | 72% - < 76% | C- | 60% - < 64% | | | | | | | | | | | | | | | |

| Timetable – topics, readings, assessment. Variations to this timetable may occur as the semester progresses. | | | |
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| <i>Week</i> | <i>Topic</i> | <i>Readings</i> | <i>Assessment</i> |
| 1 | Introduction and Descriptive Statistics | <i>McClave</i> : 1.1 to 1.3; 1.5 to 1.7; 2.1 to 2.7 | Group Discussion 1 <i>not graded</i> |
| 2 | Introduction to probability Random Variables and Probability Distributions | <i>McClave</i> : 3.1 to 3.6 Ignore “Combinations Rule” at the end of section 3.1 <i>McClave</i> : 4.1 to 4.7 Ignore Hypergeometric in section 4.4 | Group Discussion 2 (5%) <i>Date to be advised one week in advance</i> Group Discussion 3 (5%) <i>Date to be advised one week in advance</i> |
| 3 | | | |
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| 5 to 8 | Sampling distributions Central Limit Theorem Confidence intervals, selecting confidence levels, Sample sizes | <i>McClave</i> : 5.1 to 5.3 “How to choose an appropriate confidence level.pdf” <i>McClave</i> : 6.1 to 6.3; 6.5 | Test 1 (25%) <i>More details two weeks in advance</i> |
| 7, 8 or 9 | Mid-semester break | | |
| 9 to 14 | Confidence intervals, selecting confidence levels, Sample sizes - <i>continued</i> - Hypothesis tests for means, proportions and categorical data Simple and Multiple Linear Regression Regression to the mean Interventions – Impact evaluation REVIEW for exam preparation | <i>McClave</i> : 6.1 to 6.3; 6.5 <i>McClave</i> : 7.1 to 7.4 <i>McClave</i> : Chapter 10 <i>McClave</i> : 7.6 <i>McClave</i> : 11.1 to 11.7; 12.1 to 12.5; 12.6(part); 12.7(part); 12.11(part) “Dancing makes you more intelligent according to TV doctor _ Daily Mail Online.pdf” “Assessing regression to the mean effects.pdf” <i>Abstract and Background, Pages 1 and 2</i> “Guide to Evaluating the Effectiveness of Strategies for Preventing Work Injuries.pdf” <i>Sections 3.1 to 3.5 Intro (pages 18 and 19)</i> <i>Section 3.5.3 (pages 23 and 24)</i> “Regression to the mean - what it is and how to deal with it.pdf” | Test 2 (25%) <i>Date to be advised two weeks in advance</i> |
| 15 | Final exam - date to be advised (40%) | | |