Unit Outline
STAT1000 Regression and non-Parametric Inference
Semester 1, 2016

Unit study package code: STAT1000
Mode of study: Internal
Tuition pattern summary: Note: For any specific variations to this tuition pattern and for precise information refer to the Learning Activities section.
Lecture: 1 x 2 Hours Weekly
Workshop: 1 x 1 Hours Weekly
This unit does not have a fieldwork component.
Credit Value: 12.5
Pre-requisite units: 310532 (v.0) Statistical Data Analysis 102 or any previous version
OR
STAT1001 (v.0) Statistical Probability or any previous version
Co-requisite units: Nil
Anti-requisite units: Nil
Result type: Grade/Mark
Approved incidental fees: Information about approved incidental fees can be obtained from our website. Visit fees.curtin.edu.au/incidental_fees.cfm for details.
Unit coordinator:
Title: DR
Name: Dr Aloke Phatak
Phone: +61 8 9266 7138
Email: Aloke.Phatak@curtin.edu.au
Location: Building: 314 - Room: 462
Teaching Staff:
Name: Aloke Phatak
Phone: +61 8 9266 7138
Email: Aloke.Phatak@curtin.edu.au
Location: Building: 314 - Room: 462
Administrative contact:
Name: Aimee Tournay
Phone: +61 8 9266 9595
Email: Aimee.Tournay@curtin.edu.au
Location: Building: 311 - Room: 144
Learning Management System: Blackboard (lms.curtin.edu.au)
Acknowledgement of Country

We respectfully acknowledge the Indigenous Elders, custodians, their descendants and kin of this land past and present.

Syllabus

Simple and Multiple Linear Regressions: Analysis, Model Adequacy, Residuals, Transformations, Estimation of Model Parameters, Inferences, Diagnostics, Variable Selection, Model Building; Chi-square Tests; Q-Q Plots and Kolmogorov-Smirnov Test; Introduction to Non-parametric Methods; Sign Test; Signed-rank Test; Rank-sum Test; Kruskal-Wallis Test; Rank Correlation Coefficient. Students will be introduced to R, a statistical analysis and programming language that is widely used in industry, research, and academia.

Introduction

This unit begins with an introduction to non-parametric methods for hypothesis testing. These methods are distribution-free analogues of parametric methods such as one- and two-sample t-tests that have been presented in introductory statistics units. The main part of the unit is devoted to linear regression, and it will include topics such as simple and multiple linear regression, the method of least squares, diagnostic checking of models, analysis of variance, conventional and contemporary methods of variable selection, and other topics. Students will be introduced to R, a powerful statistical computing environment.

Unit Learning Outcomes

All graduates of Curtin University achieve a set of nine graduate attributes during their course of study. These tell an employer that, through your studies, you have acquired discipline knowledge and a range of other skills and attributes which employers say would be useful in a professional setting. Each unit in your course addresses the graduate attributes through a clearly identified set of learning outcomes. They form a vital part in the process referred to as assurance of learning. The learning outcomes tell you what you are expected to know, understand or be able to do in order to be successful in this unit. Each assessment for this unit is carefully designed to test your achievement of one or more of the unit learning outcomes. On successfully completing all of the assessments you will have achieved all of these learning outcomes.

Your course has been designed so that on graduating we can say you will have achieved all of Curtin’s Graduate Attributes through the assurance of learning process in each unit.

<table>
<thead>
<tr>
<th>On successful completion of this unit students can:</th>
<th>Graduate Attributes addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Analyse relationships between variables using linear regression, including transformations.</td>
<td>✅</td>
</tr>
<tr>
<td>Analysing multiple linear regression models including parameter estimation, ANOVA tables and hypothesis tests.</td>
<td>✅</td>
</tr>
<tr>
<td>Explain frequency distribution function and calculate goodness-of-fit statistics.</td>
<td>✅</td>
</tr>
<tr>
<td>Use non-parametric tests for various types of hypothesis testing.</td>
<td>✅</td>
</tr>
</tbody>
</table>

Curtin’s Graduate Attributes

- **Apply discipline knowledge**
- **Thinking skills** (use analytical skills to solve problems)
- **Information skills** (confidence to investigate new ideas)
- **Communication skills**
- **Technology skills**
- **Learning how to learn** (apply principles learnt to new situations) (confidence to tackle unfamiliar problems)
- **International perspective** (value the perspectives of others)
- **Cultural understanding** (value the perspectives of others)
- **Professional Skills** (work independently and as a team) (plan own work)

Find out more about Curtin’s Graduate attributes at the Office of Teaching & Learning website: ctl.curtin.edu.au
Learning Activities

1. One 2-hour lecture per week
2. Weekly workshop in a computer laboratory consisting of:
   - problem-solving
   - learning how to use statistical software
3. Two in-class tests on lecture and workshop material
4. Independent project, in which the student will report on the regression analysis of a dataset using the methods studied in the unit

Learning Resources

Library Reserve
There are resources for this unit in the library Reserve collection. To access these resources, please click on the following link:
http://link.library.curtin.edu.au/primo/course?STAT1000

Essential texts
The required textbook(s) for this unit are:


Online resources


Other resources
Assessment

Assessment schedule

<table>
<thead>
<tr>
<th>Task</th>
<th>Value %</th>
<th>Date Due</th>
<th>Unit Learning Outcome(s) Assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Test 1 of 2</td>
<td>15 percent</td>
<td>Week: Teaching Week 4, Day: TBA, Time: TBA</td>
<td>1,2,3</td>
</tr>
<tr>
<td>2. Test 2 of 2</td>
<td>15 percent</td>
<td>Week: Teaching Week 8, Day: TBA, Time: TBA</td>
<td>1,2,3</td>
</tr>
<tr>
<td>3. Portfolio</td>
<td>20 percent</td>
<td>Week: Teaching Week 12, Day: TBA, Time: TBA</td>
<td>1,2,3</td>
</tr>
<tr>
<td>4. Final Examination</td>
<td>50 percent</td>
<td>Week: Semester 1, 2016 Examination Period (13 - 24 June), Day: TBA, Time: TBA</td>
<td>1,2,3</td>
</tr>
</tbody>
</table>

Detailed information on assessment tasks

1. Test 1 will assess material on nonparametric methods and testing.
2. Test 2 will assess material on regression analysis up to and including Teaching Week 7.
3. In the independent project, students will be asked to document their analysis of a large dataset using appropriate regression methods and diagnostics discussed during the unit.
4. A two-hour final examination will take place during the University Examination Period (13 - 24 June). Students will be informed before the end of the semester what aids are allowed during the examination.

Pass requirements

Students must achieve a final mark of 50 or more to pass this unit.

Fair assessment through moderation

Moderation describes a quality assurance process to ensure that assessments are appropriate to the learning outcomes, and that student work is evaluated consistently by assessors. Minimum standards for the moderation of assessment are described in the Assessment and Student Progression Manual, available from policies.curtin.edu.au/policies/teachingandlearning.cfm

Late assessment policy

This ensures that the requirements for submission of assignments and other work to be assessed are fair, transparent, equitable, and that penalties are consistently applied.

1. All assessments students are required to submit will have a due date and time specified on this Unit Outline.
2. Students will be penalised by a deduction of ten percent per calendar day for a late assessment submission (eg a mark equivalent to 10% of the total allocated for the assessment will be deducted from the marked value for every day that the assessment is late). This means that an assessment worth 20 marks will have two marks deducted per calendar day late. Hence if it was handed in three calendar days late and given a mark of 16/20, the student would receive 10/20. An assessment more than seven calendar days overdue will not be marked and will receive a mark of 0.
Assessment extension

A student unable to complete an assessment task by/on the original published date/time (eg examinations, tests) or due date/time (eg assignments) must apply for an assessment extension using the Assessment Extension form (available from the Forms page at students.curtin.edu.au/administration/) as prescribed by the Academic Registrar. It is the responsibility of the student to demonstrate and provide evidence for exceptional circumstances beyond the student’s control that prevent them from completing/submitting the assessment task.

The student will be expected to lodge the form and supporting documentation with the unit coordinator before the assessment date/time or due date/time. An application may be accepted up to five working days after the date or due date of the assessment task where the student is able to provide an acceptable explanation as to why he or she was not able to submit the application prior to the assessment date. An application for an assessment extension will not be accepted after the date of the Board of Examiners’ meeting.

Deferred assessments

If your results show that you have been granted a deferred assessment you should immediately check your OASIS email for details.

Deferred examinations/tests will be held from 18/07/2016 to 22/07/2016. Notification to students will be made after the Board of Examiners’ meeting via the Official Communications Channel (OCC) in OASIS.

Supplementary assessments

Supplementary assessments, if granted by the Board of Examiners, will have a due date or be held between 18/07/2016 and 22/07/2016. Notification to students will be made after the Board of Examiners’ meeting via the Official Communications Channel (OCC) in OASIS.

It is the responsibility of students to be available to complete the requirements of a supplementary assessment. If your results show that you have been granted a supplementary assessment you should immediately check your OASIS email for details.

Referencing style

The referencing style for this unit is APA 6th Ed.

More information can be found on this style from the Library web site: http://libguides.library.curtin.edu.au/referencing.

Copyright

© Curtin University. The course material for this unit is provided to you for your own research and study only. It is subject to copyright. It is a copyright infringement to make this material available on third party websites.

Academic Integrity (including plagiarism and cheating)

Any conduct by a student that is dishonest or unfair in connection with any academic work is considered to be academic misconduct. Plagiarism and cheating are serious offences that will be investigated and may result in penalties such as reduced or zero grades, annulled units or even termination from the course.

Plagiarism occurs when work or property of another person is presented as one’s own, without appropriate acknowledgement or referencing. Submitting work which has been produced by someone else (e.g. allowing or contracting another person to do the work for which you claim authorship) is also plagiarism. Submitted work is subjected to a plagiarism detection process, which may include the use of text matching systems or interviews with students to determine authorship.

Cheating includes (but is not limited to) asking or paying someone to complete an assessment task for you or any use of unauthorised materials or assistance during an examination or test.

From Semester 1, 2016, all incoming coursework students are required to complete Curtin’s Academic Integrity Program (AIP). If a student does not pass the program by the end of their first study period of enrolment at Curtin,
their marks will be withheld until they pass. More information about the AIP can be found at: 
https://academicintegrity.curtin.edu.au/students/AIP.cfm

Refer to the Academic Integrity tab in Blackboard or academicintegrity.curtin.edu.au for more information, including student guidelines for avoiding plagiarism.

Information and Communications Technology (ICT) Expectations

Curtin students are expected to have reliable internet access in order to connect to OASIS email and learning systems such as Blackboard and Library Services.

You may also require a computer or mobile device for preparing and submitting your work.

Students will have access to all required statistical software in computer laboratories. However, they may find it convenient to install the free, open-source R language software for statistical computing and the RStudio development environment, on their personal computers or laptops.

For general ICT assistance, in the first instance please contact OASIS Student Support: oasisapps.curtin.edu.au/help/general/support.cfm

For specific assistance with any of the items listed below, please contact The Learning Centre: life.curtin.edu.au/learning-support/learning_centre.htm

- Using Blackboard, the I Drive and Back-Up files
- Introduction to PowerPoint, Word and Excel

Additional information

Enrolment

It is your responsibility to ensure that your enrolment is correct - you can check your enrolment through the eStudent option on OASIS, where you can also print an Enrolment Advice.

Student Rights and Responsibilities

It is the responsibility of every student to be aware of all relevant legislation, policies and procedures relating to their rights and responsibilities as a student. These include:

- the Student Charter
- the University’s Guiding Ethical Principles
- the University’s policy and statements on plagiarism and academic integrity
- copyright principles and responsibilities
- the University’s policies on appropriate use of software and computer facilities

Information on all these things is available through the University's "Student Rights and Responsibilities" website at: students.curtin.edu.au/rights.
**Student Equity**

There are a number of factors that might disadvantage some students from participating in their studies or assessments to the best of their ability, under standard conditions. These factors may include a disability or medical condition (e.g. mental illness, chronic illness, physical or sensory disability, learning disability), significant family responsibilities, pregnancy, religious practices, living in a remote location or another reason. If you believe you may be unfairly disadvantaged on these or other grounds please contact Student Equity at eesi@curtin.edu.au or go to http://eesi.curtin.edu.au/student_equity/index.cfm for more information.

You can also contact Counselling and Disability services: http://www.disability.curtin.edu.au or the Multi-faith services: http://life.curtin.edu.au/health-and-wellbeing/about_multifaith_services.htm for further information.

It is important to note that the staff of the university may not be able to meet your needs if they are not informed of your individual circumstances so please get in touch with the appropriate service if you require assistance. For general wellbeing concerns or advice please contact Curtin's Student Wellbeing Advisory Service at: http://life.curtin.edu.au/health-and-wellbeing/student_wellbeing_service.htm

**Recent unit changes**

Students are encouraged to provide unit feedback through eVALUate, Curtin's online student feedback system. For more information about eVALUate, please refer to evaluate.curtin.edu.au/info/.

To view previous student feedback about this unit, search for the Unit Summary Report at https://evaluate.curtin.edu.au/student/unit_search.cfm. See https://evaluate.curtin.edu.au/info/dates.cfm to find out when you can eVALUate this unit.

Recent changes to this unit include:

1. Some use of statistical software will also be assessed in Tests 1 and 2.
Program calendar
Program Calendar – Semester 2 2015

The ordering of, and emphasis on, individual topics may change slightly during the semester

<table>
<thead>
<tr>
<th>Teaching Week</th>
<th>Begin Date</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orientation</td>
<td>22 February</td>
<td>Orientation Week</td>
</tr>
<tr>
<td>1</td>
<td>29 February</td>
<td>Introduction and overview; role of statistics; review of hypothesis testing; introduction to nonparametric methods [Walpole et al. (2007), Chapter 16]</td>
</tr>
<tr>
<td>2</td>
<td>7 March</td>
<td>Nonparametric methods (continued); sign and signed-rank test, rank-sum test; ANOVA/Kruskal-Wallis test; other nonparametric tests [Walpole et al. (2007), Chapter 16]</td>
</tr>
<tr>
<td>3</td>
<td>14 March</td>
<td>Introduction to linear regression; least squares estimation; simple linear regression; introduction to inference [Sheather (2009), Ch. 2.1-2.2]</td>
</tr>
<tr>
<td>4</td>
<td>21 March</td>
<td>TEST 1\nLeast squares estimation and inference (continued); prediction intervals; introduction to analysis of variance [Sheather (2009), Ch. 2.3-2.5]</td>
</tr>
<tr>
<td></td>
<td>28 March</td>
<td>Tuition Free Week</td>
</tr>
<tr>
<td>5</td>
<td>4 April</td>
<td>Analysis of variance (continued), $R^2$; checking assumptions [Sheather (2009), Ch. 2.5, 3.1-3.2]</td>
</tr>
<tr>
<td>6</td>
<td>11 April</td>
<td>Diagnostic checking (continued); introduction to multiple linear regression, matrix approach to linear regression [Sheather (2009), Ch. 3.2, 5.1-5.2]</td>
</tr>
<tr>
<td></td>
<td>18 April</td>
<td>Tuition Free Week</td>
</tr>
<tr>
<td>7</td>
<td>25 April</td>
<td>TEST 2\nMatrix approach to linear regression (continued); analysis of variance for multiple linear regression [Sheather (2009), Ch. 5.1-5.2]</td>
</tr>
<tr>
<td>8</td>
<td>2 May</td>
<td>Estimation and inference in multiple linear regression; model comparison; diagnostics and diagnostic plots; regression with categorical/indicator variables [Sheather (2009), Ch. 5.2, 6.1, 2.6]</td>
</tr>
<tr>
<td>9</td>
<td>9 May</td>
<td>Categorical variables (continued); t-tests as linear regression; orthogonal explanatory variables [Sheather (2009), Ch. 2.6]</td>
</tr>
<tr>
<td>10</td>
<td>16 May</td>
<td>Introduction to variable selection; goodness-of-fit criteria [Sheather (2009), Ch. 7.1-7.2]</td>
</tr>
<tr>
<td>11</td>
<td>23 May</td>
<td>Forward, backward and stepwise selection; predictive criteria [Sheather (2009), Ch. 7.2-7.3]</td>
</tr>
<tr>
<td>12</td>
<td>30 May</td>
<td>PROJECT DUE\nIntroduction to logistic regression and simple time series models; exam revision</td>
</tr>
<tr>
<td></td>
<td>6 June</td>
<td>Study Week</td>
</tr>
<tr>
<td></td>
<td>13 June</td>
<td>Examinations</td>
</tr>
<tr>
<td></td>
<td>20 June</td>
<td>Examinations</td>
</tr>
</tbody>
</table>