WESTERN SYDNEY
UNIVERSITY

School of Computer, Data and Mathematical Sciences

Learning Guide

301108 Thinking About Data
Autumn 2020

Unit Details

Unit Code:	301108
Unit Name:	Thinking About Data
Credit Points:	10
Unit Level:	1
Assumed Knowledge:	2 Unit High School Mathematics.

Note: Students with any problems, concerns or doubts should discuss those with the Unit Coordinator as early as they can.

Unit Coordinator

Name: Laurence Park
Phone: (02) 9685 9065
Location: PS-EN.1.32
Email: lapark@westernsydney.edu.au
Consultation Arrangement:
Consultation at any time by appointment. Also Thursday 2pm to 3pm, email to confirm availability first.

Edition: Autumn 2020

Contents

Note: The relevant Learning Guide Companion supplements this document

1 About Thinking About Data

1.1 An Introduction to this Unit

This Unit covers basic concepts of data centric thinking. The main areas discussed are; Populations and Samples; Sampling concepts; Types of Data; Descriptive Methods; Estimation and Inference; Modelling. The Unit takes a computational and nonparametric approach, before briefly discussing theoretical concepts and distribution theory.

1.2 What is Expected of You

Study Load

A student is expected to study an hour per credit point a week. For example a 10 credit point unit would require 10 hours of study per week. This time includes the time spent within classes during lectures, tutorials or practicals.

Attendance

Lectures and tutorials are designed to scaffold learning and assist students to gain an understanding of the unit content, and subsequently to complete their assessment tasks. Students should note that attendance is considered critical for students to gain full value from this subject, and is closely correlated with student success and grades. Students are encouraged to participate in all class activities, as non-engagement may seriously undermine a students ability to satisfactorily complete the unit.

Online Learning Requirements

Unit materials will be made available on the unit's vUWS (E-Learning) site (https://vuws.westernsydney.edu.au/). You are expected to consult vUWS at least twice a week, as all unit announcements will be made via vUWS. Teaching and learning materials will be regularly updated and posted online by the teaching team.

Special Requirements

Essential Equipment:
Access to a Computer.
Legislative Pre-Requisites:
Not Applicable

Policies Related to Teaching and Learning
The University has a number of policies that relate to teaching and learning. Important policies affecting students include:

- Assessment Policy
- Bullying Prevention Policy and
- Guidelines
- Enrolment Policy
- Examinations Policy
- Review of Grade Policy
- Sexual Harassment Prevention Policy
- Special Consideration Policy
- Student Misconduct Rule
- Teaching and Learning - Fundamental Code
- Student Code of Conduct

Academic Integrity and Student Misconduct Rule
In submitting assessments, it is essential that you are familiar with the policies listed above and that you understand the principles of academic integrity. You are expected to act honestly and ethically in the production of all academic work and assessment tasks, submit work that is your own and acknowledge any contribution to your work made by others.

Important information about academic integrity, including advice to students is available at https://www.westernsydney.edu.au/studysmart/home/academic_integrity_and_plagiarism. It is your responsibility to familiarise yourself with these principles and apply them to all work submitted to the University as your own.

When you submit an assignment or product, you will declare that no part has been: copied from any other student's work or from any other source except where due acknowledgement is made in the assignment; submitted by you in another (previous or current) assessment, except where appropriately referenced, and with prior permission from the Unit Coordinator; written/produced for you by any other person except where collaboration has been authorised by the Unit Coordinator.

The Student Misconduct Rule applies to all students of Western Sydney University and makes it an offence for any student to engage in academic, research or general misconduct as defined in the Rule.

The University considers plagiarism, cheating and collusion as instances of academic misconduct. The University also considers submitting falsified documentation in support of applications for special consideration, including sitting of deferred examinations, as instances of general misconduct. You should be aware that changes were made to the Student Misconduct Rule commencing 1 January 2020 that provide for minimum sanctions that apply to certain conduct, including the provision of falsified documentation to the University.

You are strongly advised to read the Student Misconduct Rule and the Inappropriate Behaviour Guidelines at the commencement of each session to familiarise yourself with this process and the expectations of the University in relation to work submitted for assessment.

1.3 Changes to Unit as a Result of Past Student Feedback

The University values student feedback in order to improve the quality of its educational programs. The feedback provided helps us improve teaching methods and units of study. The survey results inform unit content and design, learning guides, teaching methods, assessment processes and teaching materials.

You are welcome to provide feedback that is related to the teaching of this unit. At the end of the semester you will be given the opportunity to complete a Student Feedback on Unit (SFU) questionnaire to assess the unit. You may also have the opportunity to complete a Student Feedback on Teaching (SFT) questionnaire to provide feedback for individual teaching staff.

As a result of student feedback, the following changes and improvements to this unit have recently been made:

- New examples added
- Further explanation was added to tutorial solutions.

2 Assessment Information

2.1 Unit Learning Outcomes

	Outcome
1	Describe types of data with reference to real world examples
2	Identify data collection strategies that provide unbiased and reliable data
3	Use computer software to estimate population parameters of interest
4	Use computer software to make inferences about population parameters, both non-parametrically and using Normal theory
5	Build and interpret simple predictive models using computer software
6	Describe and identify common statistical mistakes

2.2 Approach to Learning

The unit consists of face-to-face lectures, and practical/tutorial sessions. The lectures cover the essential material of the unit and provide students with an opportunity to investigate methods and ask questions. In the practical/tutorial sessions the participants learn how to use computer software to apply the methods learnt in lectures. Students should attend lectures to gain an understanding of the concepts and complete the lab work to show proficiency in the material.

2.3 Contribution to Course Learning Outcomes

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Course Learning Outcomes	ULO 1	ULO 2	ULO 3	ULO 4	ULO 5	ULO 6
1. collect or design the collection of data and extract, transform and load the data into an analysis system	Introduced					
2. visualise and present data to understand its information content and find patterns or trends	Introduced				Introduced	
3. build models and write computer code to make predictions, test hypotheses and validate conclusions drawn from the analysis process			Introduced	Introduced		
4. formulate problems and use data ethically and responsibly to provide information and advice that is reliable, valid, timely and relevant for their chosen specialty.		Introduced			Introduced	
5. present results and define actions to be taken to generate impact in application domains					Introduced	Introduced
6. provide interpretive and predictive reports for professional colleagues to inform decision-making		Introduced	Introduced	Introduced		
7. advise on the technical validity and reliability of interpretations and predictions based on analysis of large data sets		Introduced				Introduced
8. advise on the methods and ethics of data collection and use within a professional context.		Introduced	Introduced	Introduced		Introduced

2.4 Assessment Summary

The assessment items in this unit are designed to enable you to demonstrate that you have achieved the unit learning outcomes. Completion and submission of all assessment items which have been designated as mandatory or compulsory is essential to receive a passing grade.

To pass this unit you must:

Achieve a mark of at least 50% overall.

Item	Weight	Due Date	ULOs Assessed	Threshold
Online Quizzes	20%	Weeks 3, 5, 7, 10 & 12	1, 2, 3, 4, 5, 6	No
Computer Test	40%	Exam Period	3, 4, 5	No
Assignment	40%	Week 12	3, 4, 5	No

Feedback on Assessment

Feedback is an important part of the learning process that can improve your progress towards achieving the learning outcomes. Feedback is any written or spoken response made in relation to academic work such as an assessment task, a performance or product. It can be given to you by a teacher, an external assessor or student peer, and may be given individually or to a group of students. As a Western Sydney University student, it is your responsibility to seek out and act on feedback that is provided to you as a resource to further your learning.

For online quizzes students will receive feedback marks after the closing date of the quiz. The assignment will be marked and returned to students after a week from the submission date.

2.5 Assessment Details

2.5.1 Online Quizzes

Weight:	20%
Type of Collaboration:	Individual
Due:	Weeks 3, 5, 7, 10 & 12
Submission:	Online
Format:	30 minutes online through vUWS. The quiz will be open for approximately one week.
Length:	5x 30 min
Curriculum Mode:	Quiz

The quiz will be based on the material covered in lectures and practicals. It may consist of multiple choice or short answer or numeric questions. Some questions may require the use of software to compute a solution. Students are required to use vUWS to complete the quizzes. Each quiz will take the form of a multiple choice or short answer question.

Marking Criteria:

Criteria	High Distinction	Distinction	Credit	Pass	Unsatisfactory
Mark	85% or higher	75 to 84%	65 to 74%	50 to 64%	less than 50%

2.5.2 Computer Test

Weight:	40%
Type of Collaboration:	Individual
Due:	Exam Period
Submission:	In the Lab
Format:	1 hour exam using computer software in the Lab
Length:	Lab based 1 hour practical test
Curriculum Mode:	Practical

The exam will consist of practical based questions using computer software and data sets. Students will be required to attend the computer lab at the allocated time. The exam will be presented to students once in the lab with instructions on how to complete the exam.

Marking Criteria:

Criteria	High Distinction	Distinction	Credit	Pass	Unsatisfactory
Mark	85% or higher	75 to 84%	65 to 74%	50 to 64%	less than 50%

2.5.3 Assignment

Weight:	40%
Type of Collaboration:	Individual
Due:	Week 12
Submission:	In the lecture
Format:	Written report
Length:	3 weeks/approx. 2000 words
Curriculum Mode:	Report

The Assignment will consist of a practical based activity and a written report, using techniques learnt in the first half of semester. An assignment specification sheet will be provided to students using vUWS containing instructions on how to complete the assignment.

Marking Criteria:

Criteria	High Distinction	Distinction	Credit	Pass	Unsatisfactory
Mark	85% or higher	75 to 84%	65 to 74%	50 to 64%	less than 50%

2.6 General Submission Requirements

Submission

- All assignments must be submitted by the specified due date and time.
- Complete your assignment and follow the individual assessment item instructions on how to submit. You must keep a copy of all assignments submitted for marking.

Turnitin

- The Turnitin plagiarism prevention system may be used within this unit. Turnitin is accessed via logging into vUWS for the unit. If Turnitin is being used with this unit, this means that your assignments have to be submitted through the Turnitin system. Turnitin from iParadigms is a web-based text-matching software that identifies and reports on similarities between documents. It is also widely utilised as a tool to improve academic writing skills. Turnitin compares electronically submitted papers against the following:
  - Current and archived web: Turnitin currently contains over 24 billion web pages including archived pages
  - Student papers: including Western Sydney University student submissions since 2007
  - Scholarly literature: Turnitin has partnered with leading content publishers, including library databases, text-book publishers, digital reference collections and subscription-based publications (e.g. Gale, Proquest, Emerald and Sage)

- Turnitin is used by over 30 universities in Australia and is increasingly seen as an industry standard. It is an important tool to assist students with their academic writing by promoting awareness of plagiarism.By submitting your assignment to Turnitin you will be certifying that:
  - I hold a copy of this assignment if the original is lost or damaged
  - No part of this assignment has been copied from any other student's work or from any other source except where due acknowledgement is made in the assignment
  - No part of the assignment has been written for me by any other person/s
  - I have complied with the specified word length for this assignment
  - I am aware that this work may be reproduced and submitted to plagiarism detection software programs for the purpose of detecting possible plagiarism (which may retain a copy on its database for future plagiarism checking).

Self-Plagiarising

- You are to ensure that no part of any submitted assignment for this unit or product has been submitted by yourself in another (previous or current) assessment from any unit, except where appropriately referenced, and with prior permission from the Lecturer/Tutor/Unit Co-ordinator of this unit.

Late Submission

- If you submit a late assessment, without receiving approval for an extension of time, (see next item), you will be penalised by 10% per day for up to 10 days. In other words, marks equal to 10% of the assignment's weight will be deducted from the mark awarded.
- For example, if the highest mark possible is 50, 5 marks will be deducted from your awarded mark for each late day.
- Saturday and Sunday are counted as one calendar day each.
- Assessments will not be accepted after the marked assessment task has been returned to students.
- This is consistent with Clause 51 of the Western Sydney University's Assessment Policy - Criteria and Standards-Based Assessment.

Extension of Due Date for Submission

Extensions are only granted in exceptional circumstances. To apply for an extension of time, locate an application form via the Western Sydney University homepage or copy the following link:
https://www.westernsydney.edu.au/currentstudents/current_students/forms

Application forms must be submitted to the Unit Coordinator/Convenor. Requests for extension should be made as early as possible and submitted within policy deadlines. Appropriate, supporting documentation must be submitted with the application. An application for an extension does not automatically mean that an extension will be granted. Assessments will not be accepted after the marked assessment task has been returned to students.

Resubmission

Resubmission of assessment items will not normally be granted if requested.

Application for Special Consideration

It is strongly recommended that you attend all scheduled learning activities to support your learning. If you have suffered misadventure, illness, or you have experienced exceptional circumstances that have prevented your attendance at class or your completion and submission of assessment tasks, you may need to apply for Special Consideration via the Western Sydney University website. http://www.westernsydney.edu.au/currentstudents/current_students/services_and_facilities/special_consideration2 or the Student Centre/Sydney City Campus Reception. Special Consideration is not automatically granted. It is your responsibility to ensure that any missed content has been covered. Your lecturer will give you more information on how this must be done.

3 Teaching and Learning Activities

Weeks	Topic	Prac/Lab	Assessments Due
Week 1 02-03-2020	Introduction and " Are the digits of pi random?"	No Lab this week	
Week 2 09-03-2020	Counting Eels and Iraqi Refugees	Using R, and Excel to count.	
Week 3 16-03-2020	Maternal smoking and birth weight	R and the chi-square statistic	- Online Quizzes
Week 4 23-03-2020	Maternal Smoking and Birth Weight (cont)	R and the t-statistic	
Week 5 30-03-2020	Mapping disease	More R, and probability.	- Online Quizzes
Week 6 06-04-2020	Observation or Experiment?	Binomials and Poisson	
Week 7 13-04-2020	Do taller people earn more?	Relationships between variables	- Online Quizzes
Week 8 20-04-2020	No really, do taller people earn more?	Correlation, Causation and regression	
Week 9 27-04-2020	Intra Session Break		
Week 10 04-05-2020	Do redheads have a lower pain threshold?	One way or ANOVA	- Online Quizzes
Week 11 11-05-2020	What is Normal anyway?	Gauss and his distribution	
Week 12 18-05-2020	Normality as opposed to being deviant, eccentric or unusual	Make it Normal.	- Online Quizzes - Assignment
Week 13 25-05-2020	When it all goes wrong.	Examples of real life stuff ups.	
Week 14 01-06-2020	Revision	Revision	
Week 15 08-06-2020	STUVAC		

Weeks	Topic	Prac/Lab	Assessments Due
Week 16 15-06-2020	Computer Test		- Computer Test
Week 17 22-06-2020			

The above timetable should be used as a guide only, as it is subject to change. Students will be advised of any changes as they become known on the unit's vUWS site.

4 Learning Resources

4.1 Recommended Readings

Essential Reading

Dalgaard, P. (2008). Introductory statistics with R (2nd ed.). New York: Springer.

Reinhart, A. (2015). Statistics Done Wrong. San Francisco, CA: No Starch Press.

Additional Reading

Lock, R. H. (Ed.). (2013). Statistics : unlocking the power of data. Hoboken, N.J.: Wiley.

Zumel, N., & Mount, J. (2014). Practical Data Science with R. Shelter Island, NY: Manning Publications.