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Study Guide

Data Management and Statistical Computing (DMC)

Semester 2, 2020

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Welcome Letter

Welcome to Data Management and Statistical Computing (DMC). In this unit we will develop statistical computing skills essential for managing and analysing data in health and medicine. This course provides an introduction to R and Stata, with the aim of giving you a foundation to build upon in your further studies and in your biostatistical career. This unit is delivered through the eLearning site at the University of Sydney. All course content other than readings (discussed below) will be uploaded to eLearning, including assignments and supplementary material. Discussions of material will take place on the Discussion Board. There is currently an Introductions thread on Discussion Board; please use this thread to introduce yourself to the rest of the class. This unit requires access to two statistical software packages: R and Stata (detailed shortly). You should organise access to these as soon as possible. Since we have recently introduced R into the course in 2019, we would appreciate as much feedback as possible for continuing improvement of the unit material for future deliveries.

If you have any questions or issues, please contact me by email at the address above. I hope you enjoy the course!

Michael Waller
July 2020

Background

This course aims to provide students with skills to undertake moderate to high level data management, manipulation, and analysis. On completion of this unit, students should:

1. Be able to undertake data manipulation and management using two major statistical software packages (Stata and R);

2. Be able to appropriately display and summarise data using statistical software;

3. Understand how to check and clean data;

4. Be able to link data files through unique and non-unique identifiers;

5. Have fundamental programming skills for efficient use of statistical software;

6. Understand key principles of confidentiality and privacy in data storage, management and analysis.

Course Content

This course consists of three modules:

*   Module 1: The basics. Importing and exporting data; recoding and formatting data; labelling variables and values; use of date data, displaying and summarising data.
*   Module 2: Graphs, Data management and Statistical Quality Assurance Methods. Includes advanced graphics for production of publication-quality graphs.
*   Module 3: Data Management. Using functions to generate new variables; appending, merging and transposing data; programming skills including loops, arguments and programs/macros.

Each module requires approximately 4 weeks of study; the final week of semester will be left for revision, or to cover other issues which arise during the course.

Course material consists of (a) the notes which are provided for each module, (b) the text books and other required reading, and (c) further notes, code and data files which will be provided on eLearning.

Study materials for all Modules are downloadable form the eLearning (Canvas) unit site. Assignments and supplementary material, such as data sets will be posted to the unit site. Please note that we are not able to post copies of copyright material (journal articles and

book extracts)—for these you will have to rely on resources from your home university's library.

Workload requirements

The expected workload for this unit is 10-12 hours per week on average, consisting of guided readings, discussion posts, independent study and completion of assessment task.

Recommended approaches to study

Students should work through each module systematically, following the module notes and any readings referred to, and working through the accompanying exercises. *You will learn a lot more efficiently if you tackle the exercises systematically as you work through the notes.* You are encouraged to post any content-related questions to eLearning, whether they relate directly to a given exercise, or are a request for clarification or further explanation of an area in the notes. You should also work through all of the computational examples in the notes for yourself on your own computer.

Outline solutions to the exercises in each module (except those to be submitted for assessment, as described below) will be posted online.

Method of communication with coordinator

We strongly recommend that you post content-related questions to the Discussions tool in the (DMC) area of BCA's eLearning site. There is a "Getting Started" document available on the Student Resources page of the BCA website.

Questions about administrative aspects or course content can be emailed to the coordinator, and when doing so please use "DMC:" in the Subject line of your email to assist in keeping track of our email messages.

Please note that it might take a day or two to respond to your queries (possibly longer during breaks and over weekends!).

Text Books

You should have access to the following textbooks:

Jull S, Frydenberg M. An Introduction to Stata for Health Researchers, 4th ed. Stata Press, 2014.

Wickham H, Grolemund G. R for Data Science. O'Reilly 2017. Dalgaard, P. (available online https://r4ds.had.co.nz/)

I recommend you check your University Libraries to see if ebook (Full Text Online) versions are available. If you have any issues accessing these text books please contact me.

Readings

In addition to the text books, various other materials are set as required or supplementary readings in each module. These cannot be uploaded to eLearning but you should be able to access these articles through your university's library; further assistance in accessing readings will be given during the course if necessary.

Software

You should have access to the following software packages:

- Stata version 12 or later (the latest version is v16)
- R version R64 3.4.2 or later

If you have not yet organised access to these packages, you should do so as soon as possible. This is a practical course which requires regular use of the relevant software; delays in gaining access to these packages may impact your ability to complete the course.

Information on how to download R, and access Stata can be found in the BCA Textbook and Software Guide.

Module Descriptions

As described above, there are 3 modules in this course here we outline the timetable and assessment description.

Each module is scheduled to begin on a Monday and conclude on the Sunday of the following week. The due date for submission of required assignments from each module is 2pm on the day it is described to be due as indicated below in the table.

Course Timetable

Semester 2, 2020 will commence on Monday 3rd August

Week	Week Commencing	Module	Assessment
1	Monday 3rd August	1A	
2	Monday 10th August	1A	Assignment 1 Available Friday 14th August
3	Monday 17th August	1B	
4	Monday 24th August	1B	
5	Monday 31th August	2A	**Assignment 1 Due Monday 31st August**
6	Monday 7th September	2A	Assignment 2 Available Friday 11th September
7	Monday 14th September	2B	
8	Monday 21st September	2B	
			Assignment 2 Due Monday 28th September
Monday 28th September to Sunday 4th October – Mid Semester Break			
9	Monday 5th October	3A	
10	Monday 12th October	3A	
11	Monday 19th October	3B	Assignment 3 Available Friday 23rd October
12	Monday 26th October	3B	
			Assignment 3 Due Monday 9th November

Assessment

The assessment for this unit consists of three assignments:

- Assignment 1 will cover Module 1, and is worth 30% of the overall course mark. It is due before 2pm (EST) on Monday 31st August 2020.

- Assignment 2 will cover Module 2, and is worth 35% of the overall course mark. It is due before 2pm (EST) on Monday 28th September 2020.

- Assignment 3 will cover Module 3, as well as Modules 1 and 2, and is worth 35% of the overall course mark. It is due before 2pm (EST) on Monday 9th November 2020.

All assignments will be posted on eLearning 2.5 weeks before the due date. Individual feedback will be provided to each student; model solutions will also be provided once all marked assignments have been returned. Summary statistics on results for the entire class will also be provided.

Assignments should be submitted via the assignment submission tool on eLearning; if you experience difficulties with this submission method, assignments can be submitted via email.

Submission of assessments and academic honesty policy

All assessment material must be submitted via canvas unless otherwise advised. The use of Turnitin for submitting assessment items has been instigated within unit sites. For more details please see pages 3-5 the BCA student Assessment Guide.

The BCA pays great attention to academic honesty procedures. Please be sure to familiarise yourself with these procedures and policies at your university of enrolment. Links to these are available in the BCA Student Assessment Guide. When submitting assessments using Turnitin you will need to indicate your compliance with the plagiarism guidelines and policy at your university of enrolment before making the submission.

Extensions

For various reasons, you may sometimes experience difficulties in getting your assignments submitted on the due date. Requests for an extension for an assignment must be made **in advance of the due date for that assignment**. The normal grounds for an extension being granted are bereavement, personal illness or illness in a family member requiring you to exercise a significant career role.

These requests must be made directly to Michael Waller by email, and should include appropriate documentation (e.g. medical certificate). The time and date of the request will be noted, and a reply sent by email with the decision as to whether an extension has been granted and, if so, stating the length of the extension.

Length of extension: Extensions granted by Unit Coordinators will normally be no longer than three days. Extensions longer than 3 days must be approved by your home University.

Late submission of assessments and extension procedure

The standard BCA policy for late penalties for submitted work is a 5% deduction from the earned mark for each day the assessment is late, up to a maximum of 10 days (including weekends and public holidays). Extensions are possible, but these need to be applied for (by email) as early as possible. The Unit Coordinator is not able to approve extensions beyond three days; for extensions beyond three days you need to apply to your home university, using their standard procedures.

Feedback

Our feedback to you:

The types of feedback you can expect to receive in this unit are:

- Formal individual feedback on submitted exercises assignments
- Responses to questions posted on Canvas

Your feedback to us:

One of the formal ways students have to provide feedback on teaching and their learning experience is through the BCA student evaluations at the end of each unit. The feedback is anonymous and provides the BCA with evidence of aspects that students are satisfied with and areas for improvement.

Changes to DMC since last delivery, including changes in response to student evaluation

DMC was last delivered in Semester 1 2020. In Semester 1, 2020, the R notes have been redeveloped by Dr Jennie Louise.

Acknowledgements

We thank The University of Melbourne for sharing its learning modules which aided in preparing the R module for this semester. Dr Michael Waller would also like to thank Dr Jennie Louise and Dr Murthy Mittinty from the University of Adelaide for their work in revising and updating the DMC materials.