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ACADEMIC COORDINATORS

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OTHER CONTACTS

If you have trouble contacting the academic coordinator/academic staff, or have any other queries, please contact:

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Executive Officer
Biostatistics Collaboration of Australia
NH&MRC Clinical Trials Centre
University of Sydney
NSW 2006

Phone: 02 9562 5076
Fax: 02 9562 5350
Email: erica@ctc.usyd.edu.au
Dear Student,

Welcome to Mathematical Background for Biostatistics (MBB). In this unit, we will develop the basic mathematical background needed to understand the proofs and mathematical reasoning used in the detailed treatment of biostatistical methods in subsequent units. Completion of this unit will allow you to concentrate on the statistical concepts presented in the later units without being distracted by the detail of the mathematical techniques.

In the light of the preparatory nature of the material, the primary sources are two mathematics textbooks. There is little requirement for reading beyond those works.

One topic worthy of mention is the role of computer algebra systems (CAS) in relation to this unit. These are computer programs capable of solving abstract mathematical problems and are accessible on a number of platforms including CAS calculators, specialised packages such as Maple and Mathematica and on websites such as http://www.wolframalpha.com/. Such packages are able to solve many of the problems given in the textbook with little effort or understanding on the part of the user. It is therefore important to understand that the purpose of setting exercises is to help you develop skills in mathematical reasoning through practicing the calculations rather than just to get a correct answer by any means available. It is, of course, convenient and useful to use a CAS package to check your calculations but you should not allow this to become the focus.

Please don’t hesitate to contact us if you are having problems with the unit material.

Melissa Tacy and Lewis Mitchell
February 2015
UNIT BACKGROUND

This unit of study is offered throughout Australia through the Biostatistics Collaboration of Australia (BCA). It is available in distance learning mode only, to students enrolled in postgraduate degrees in biostatistics coordinated by the BCA.

The purpose of MBB is to prepare students with little training in mathematics to study statistics at an advanced level. Students who have studied mathematics or statistics at undergraduate level, or who have equivalent work experience, are exempted from this unit.

On completion of this unit you should be able to follow the mathematical demonstrations and proofs used in biostatistics at Masters Degree level, and to understand the mathematics behind the statistical methods introduced. This will allow you to concentrate on statistical concepts in subsequent units of your BCA program, with confidence in your mathematics.

The use of eLearning (sometimes referred to as Blackboard) is very important in this unit and provides a guide to the unit material. This is the forum used to generate discussion of the unit content, to answer questions and to ensure that students have a solid comprehension of the necessary concepts.
UNIT OBJECTIVES

On completion of this unit, students should be able to:

1. Manipulate general mathematical expressions and inequalities.
2. Understand the notion of a limit and calculate simple limits.
3. Understand the notion of the derivative and its applications, and calculate simple derivatives.
4. Understand the notion of the integral and its applications, and calculate simple integrals.
5. Manipulate and evaluate simple matrix expressions.
6. Understand matrix concepts such as determinant, inverse, rank, orthogonal matrix, eigenvalues and eigenvectors.
7. Appreciate the nature and importance of mathematical arguments.
UNIT CONTENT

The subject will consist of three modules. These will cover the topics of:

Module 1    Numbers, Functions and Limits
Module 2    Calculus
Module 3    Matrices

Module 1 will require approximately 2 weeks of study, Modules 2 will require approximately 5 weeks of study and Module 3 will require approximately 4 weeks of study, with a week free after each module for the associated assignment. The work for each week consists of readings and exercises. The exercises are not assessed, but the assignment questions will be similar so the exercises will be useful practice. Material will be accessed through the text books, which are required reading. Additional material will be provided as required. Notes will be provided for each module which will include the relevant text references, notes and exercises. Written material will be supplemented by discussion on eLearning.

SOFTWARE AND TEXT BOOKS

The computing in this unit does not require a statistical software package. However, graphs are an important tool for understanding mathematics, and we assume you have access to Wolfram Alpha, Microsoft Excel or Stata and can use it for calculations and for graphing functions. The “student resources” page on the BCA web site provides self-teaching materials for Excel and Stata. Wolfram Alpha is free and can be accessed at http://www.wolframalpha.com.

You WILL NEED a copy of both of the following text books, making sure you have the exact edition mentioned:

Anton H, Bivens I and Davis S
Calculus: Early Transcendentals, 10th Edition
Student Companion Site:
http://bcs.wiley.com/he-bcs/Books?action=index&itemId=0470647698&bcsId=6791
Australian distributor:
It is available from university bookshops, from Jacaranda Wiley Ltd (1800 777 474) or online from fishpond.com.au or amazon.com or via addall.com. Be sure you have the correct version: not “late transcendentals”, and not the “brief edition”. The ISBN identifies the right one.
Anton H  
Elementary Linear Algebra, 11th Edition  
Student Companion Site:  
http://bcs.wiley.com/he-bcs/Books?action=index&itemId=1118473507&bcsId=8465  
Australian distributor:  
http://www.wiley.com/legacy/products/worldwide/jacaranda/  
It is also available from university bookshops, from Jacaranda Wiley Ltd (1800 777 474) or online from fishpond.com.au or amazon.com or via addall.com.  
Be sure you have the correct version: **not** “Applications Version”. The ISBN identifies the right one.  

Additional material is available at the Student Companion Site for both text books and will be referred to during this course.
METHOD OF DELIVERY

Students will be provided with three modules, as outlined in the previous section. These modules will also be made available on eLearning. The unit assessments will be available on eLearning and will not be provided to students on an individual basis. Important announcements will also be placed on eLearning, so students should regularly monitor eLearning.

Communication should generally be via eLearning (unless of a personal/confidential nature) as responses to questions and discussion of issues is of benefit to all students. eLearning is an integral component of the MBB unit as it hopefully reduces the isolation which can occur in distance learning. Students can post questions, ideas, suggestions and discussion on eLearning. The tutors will monitor and respond to all communication, however students are also encouraged to respond and take part in these communications.

STAFF ROLES

There are three staff involved in delivering the unit. As the academic coordinators, Melissa Tacy and Lewis Mitchell will be primarily responsible for the unit. However, all staff will contribute to the discussion on eLearning and respond to content-related questions.

CONTACTING STAFF

You can use the general MBB email address (BCA_MBB@adelaide.edu.au) to contact all staff involved in delivering this unit.

Alternatively, you can contact Melissa Tacy or Lewis Mitchell directly in relation to requests for extensions or other personal matters. Email is the preferred method of contact and a copy of all emails should be sent to Tessa Longstaff (email addresses are stated earlier in this Study Guide).

To facilitate timely responses to your enquiries, please include BCA – MBB and the module in question, or general enquiry, in the subject field of all emails. For example, you may send an email with one of the following subject lines: ‘BCA – MBB Module 1 enquiry’ or ‘BCA – MBB general enquiry’.
**ASSESSMENT**

The assessment for this unit will involve three written assignments.

Assignment 1 will cover Module 1 and will be worth 20%.

Assignment 2 will cover Module 2 and will be worth 40%.

Assignment 3 will cover Module 3 and will be worth 40%.

All assignments will be posted on eLearning three weeks prior to the submission date. Model solutions/guides will be posted on eLearning after the submission date.

Individual feedback on assignments will be provided to each student. Students will also be provided with summary statistics on the results for the entire class so that they can judge their relative performance for each assignment.

Students are expected to monitor eLearning for the posting of assignments, solutions and feedback. Email notifications and other channels of communication will not be used.

Examples and exercises are contained in each module to enable students to ascertain their level of understanding of various topics. These will not form part of the assessment for this unit.

The Unit Timetable below shows the due dates for the assignments and a guide to the pace at which students should progress through the unit material.
**UNIT TIMETABLE**

Semester 1, 2014 will commence on Monday March 2.

<table>
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<th>Study Week</th>
<th>Week Commencing</th>
<th>Topic</th>
<th>Assessment</th>
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<tr>
<td>1</td>
<td>2 March 2014</td>
<td>Module 1: Numbers and Functions</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>9 March 2014</td>
<td>Module 1: Limits</td>
<td>Assignment #1, Due Monday 23 March</td>
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<td></td>
<td>16 March 2014</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>23 March 2014</td>
<td>Module 2: Calculus 1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>30 March 2014</td>
<td>Module 2: Calculus 2</td>
<td></td>
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<tr>
<td></td>
<td>6 April 2014</td>
<td>Easter Holiday and Mid Semester Break 1 week only</td>
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<td>5</td>
<td>13 April 2014</td>
<td>Module 2: Calculus 3</td>
<td></td>
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<tr>
<td>6</td>
<td>20 April 2014</td>
<td>Module 2: Calculus 4</td>
<td>Assignment #2, Due Monday May 4</td>
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<td></td>
<td>27 April 2014</td>
<td></td>
<td></td>
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<tr>
<td>7</td>
<td>4 May 2014</td>
<td>Module 3: Matrices and Determinants</td>
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<td>8</td>
<td>11 May 2014</td>
<td>Module 3: Vector Spaces I</td>
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<tr>
<td>9</td>
<td>18 May 2014</td>
<td>Module 3: Vector Spaces II</td>
<td></td>
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<tr>
<td>10</td>
<td>25 May 2014</td>
<td>Module 3: Least Squares</td>
<td></td>
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<tr>
<td>11</td>
<td>1 June 2014</td>
<td>Module 3: Eigenvalues, Eigenvectors and Diagonalization</td>
<td>Assignment #3, Due Monday June 15</td>
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<td></td>
<td>8 June 2014</td>
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EXTENSIONS

Requests for extension of the due date for an assignment must be made in advance of the due date for that assignment. These requests must be made directly to Melissa Tacy or Lewis Mitchell by email (a copy of the email should also be sent to Tessa Longstaff). You will then receive a reply by email with the decision as to whether an extension has been granted and the new due date (if applicable).

Where a student is so incapacitated by a medical or other condition that he or she is unable to request an extension in advance, medical or other certification should explicitly note the severity of the disabling condition that precluded the advance request being made.

Note that due to prerequisites, late results may preclude students from studying subsequent units of study. As such, extensions for Assignment 3 will only be considered after assurance is given from the university in which the student is enrolled that this will not impact on subsequent enrolments.

PENALTIES FOR LATE SUBMISSION

Assignments should be submitted no later than midnight EST on the due date. Submissions after this time will be penalised at a rate of 5% of the earned mark per day, up to a maximum of 50%. Submissions after the solutions have been posted on eLearning will not be awarded any marks.

For example, if your mark for an assignment is 40/50 but you submit it two days late, 10% of your mark will be deducted so your final mark will be 36/50.
eLearning

The online learning package used by the BCA is called eLearning (sometimes referred to as Blackboard). The BCA eLearning site will be accessed through the University of Sydney (USyd) server. The BCA online facilities are, however, independent of the policies and procedures of this university. You will have access to online help at the USyd ITS and eLearning Helpdesks. A guide to getting started in eLearning is posted in the Student Resources section on the BCA website.

Online learning will be one of the tools used to provide access to materials and solutions to exercises, and as a communication tool. Students are encouraged to post content-related questions in the Discussion facility in eLearning.

eLearning Helpdesk

For further assistance with eLearning, you can contact the eLearning Helpdesk at http://sydney.edu.au/elearning/student/help/emailUs.php

Please note: If you have queries about the subject matter for MBB, you should contact the academic coordinators, Melissa Tacy and Lewis Mitchell.

If you are experiencing difficulties getting help, please contact the BCA coordinating office on 02 9562 5076, or email erica@ctc.usyd.edu.au.
ASSIGNMENT SUBMISSION

You are strongly encouraged to submit assignments using the Assignment tool in eLearning. However, you may also send your assignment submission via email or Express Post (not registered post). A day’s leeway will be taken into consideration for Express Post. You must keep a copy of all assignments submitted for assessment.

Identifying details (MBB assignment and number, and your name) must be inserted in the header or footer box so that they appear on every page. If your submission is hand written, please write these details on every page. You must also include the page number and the total number of pages on each page of your assignment (e.g. Page 1 of 10).

SUBMITTING VIA eLEARNING

Instructions for Blackboard: In the Course Content folder of the MBB site, clicking on the links for assignments will take you to the relevant assignment page. On this page, you can download your assignment and, once completed, submit it on the same page.

In the Assignment Information section at the top of the page, you will find a link to the assessment document for downloading to your computer. In the Assignment Materials and Submit sections, you can upload and submit your completed assessment item. Note that you can add a short comment in the Comments box (under the Attach file line) if any additional comments are required.

Further instruction about how to submit assignments online can be found at: http://sydney.edu.au/elearning/student/help/assignments.shtml

All submissions via eLearning should be labeled with MBB assignment and number, and your initials (e.g. MBB_assignment1_ABC).

In MBB site in Blackboard, each assessment item will have an assignment Declaration. Submission of the assessment item online will mean that you have agreed to the Compliance Declaration. See page 4 of the BCA Assessment Guide for details.

SUBMITTING VIA EMAIL

The email address for assignment submission is:

BCA_MBB@adelaide.edu.au

All submissions via email should be labelled with MBB assignment and number, and your initials (e.g. MBB_assignment1_ABC). The subject of the email should be the same as the name of your attached file.
**SUBMITTING VIA EXPRESS POST**

The postal address for assignment submission is:

Attn: Tessa Longstaff - MBB  
School of Mathematical Sciences  
Level 6, Ingkarni Wardli Building  
The University Of Adelaide  
SA 5005

**ASSIGNMENT COVER SHEET**

Where assignment work is submitted online using the Assignment tool in eLearning, you will be able to indicate your compliance with the plagiarism guidelines and policy by electronic means. In this case, you **do not** need to complete the MBB 2015 Assignment Cover Sheet.

If you submit work by another method, then you **do** need to complete the MBB 2015 Assignment Cover Sheet, in which you will be asked to certify that the submission is your own work and that you have read the policy of the university at which you are enrolled (see Appendix 2). The cover sheet can also be downloaded from eLearning.

If you are posting your submission, please include the signed cover sheet in the envelope.

If you are submitting via email, please scan the signed cover sheet and submit this with your assignment.
BCA ASSESSMENT GUIDE - MBB

You should read through the BCA Assessment Guide, see
www.bca.edu.au/linked%20docs/Student%20resources/5_BCA_assessment_guide_student.pdf

This contains:

- Guidelines for written work
- Guidelines for submission of assignments and exams
- BCA policies and procedures, including the complaints policy
- “Own Work” guidelines: advice on use of internet sites
APPENDIX 1: MBB 2015 ASSIGNMENT COVER SHEET
If you are submitting your assignment via email, scan the signed cover sheet and submit it with your assignment. If you are sending a hard copy of your assignment, include the signed cover sheet with your submission and send by Express Post. If you are submitting using eLearning, you do not need to complete this cover sheet.

Email: BCA_MBB@adelaide.edu.au
Post: Attn: Tessa Longstaff - MBB
School Of Mathematical Sciences
Level 6, Ingkarni Wardli Building
The University of Adelaide
SA 5006

MBB 2015: assignment no. _____

Academic coordinators: Melissa Tacy and Lewis Mitchell

I certify that:
1. I have read the policy on plagiarism associated with the university in which I am enrolled.
2. This assignment is my own work, and to the extent that any part of this work is not my own, I have indicated that it is not by acknowledging the source of that part or those parts of the work.
3. This assignment has not previously been submitted for academic credit and is not the result of collaboration with others.
4. I understand that failure to comply with the student plagiarism policy and procedures of the university in which I am enrolled may lead to the University commencing proceedings against me for student misconduct, in accordance with the By-Laws of the University.
5. I have kept a copy of this assignment.

NAME ____________________________________________

SIGNED ____________________________________________

DATE ____________________________________________

See ‘BCA Assessment Guide - MBB’ (www.bca.edu.au/linked%20docs/Student%20resources/5_BCA_assessment_guide_student.pdf) for a complete list of submission guidelines and BCA assessment policies and procedures. The guide contains a list of Home University websites outlining university policies, procedures and advice regarding plagiarism, own work and citing sources.