# MATH 1003 BIOMETRY

**Credit Points** 10

**Legacy Code** 200263

**Coordinator** Preethi Kottegoda (https://directory.westernsydney.edu.au/search/name/Preethi Kottegoda/)

**Description** Biometry introduces students to various statistical techniques necessary in scientific endeavours. Presentation of the content will emphasise the correct principles and procedures for collecting and analysing scientific data, using a hands-on approach. Topics include effective methods of gathering data, statistical principles of designing experiments, error analysis, describing different sets of data, probability distributions, statistical inference, non-parametric methods, simple linear regression and analysis of categorical data.

**School** Computer, Data & Math Sciences

**Discipline** Statistics

**Student Contribution Band** HECS Band 1 10cp

Check your fees via the Fees (https://www.westernsydney.edu.au/currentstudents/current_students/fees/) page.

**Level** Undergraduate Level 1 subject

**Equivalent Subjects** MATH 1032 - Statistics for Science MATH 1028 - Statistical Decision Making MATH 1030 - Statistics for Business ECON 1006 - Introduction to Economic Methods 30123 - Management Analytics

**Incompatible Subjects** MATH 1025 - Quantitative Techniques

**Assumed Knowledge**

HSC Mathematics or equivalent.

## Learning Outcomes

On successful completion of this subject, students should be able to:

1. apply the basic principles of statistical design incorporating error analysis
2. design a simple scientific experiment, and then carry out and analyse the data obtained
3. estimate population means using confidence intervals
4. test hypotheses about population means using parametric techniques and find appropriate sample sizes for experiments
5. use regression and correlation techniques to describe relationships between variables
6. use the chi-square test for goodness of fit and test for independence to analyse categorical type data
7. develop statistical computing skills as part of a 'tool-kit' for solving statistical problems. (R-commander)

## Subject Content

1. Overview - What is Statistical Thinking? And what role does in play in Scientific Research.
2. Gathering Data - Types of data and dealing with measurements
3. Statistical Principles of Design - understanding randomness; types of sampling including observational studies, experiments, blocking and stratification, and levels of replication; sampling concerns.
4. Describing Sets of Data - Qualitative data; graphical methods for describing quantitative data; numerical measures of central tendency and variability; dealing with errors; error bars
5. Basic probability concepts; enough to understand p-values, confidence intervals and independence. Normal distributon and methods for assessing normality; use of transformations to meet assumptions; sampling distributions; the Central Limit Theorem.
6. Estimation with Confidence Intervals: Single sample - Large and small sample confidence intervals for a population mean; determining the sample size.
7. Tests of Hypothesis: Single sample - Elements of a statistical test; type I and type II errors; large and small sample test of hypothesis about a population mean; p-values.
8. Comparing Population Means: Estimation and Hypothesis testing - Comparing two population means: independent sampling and paired difference sampling; comparing three or more population means: one-way and two-way ANOVA;
9. Simple Linear Regression and Correlation - Least squares approach; assessing the usefulness of the model; using the model for estimation and prediction; the coefficients of correlation and determination.
10. Analysis of Categorical Data - Test for independence and 'Goodness-of-fit' test.

## Assessment

The following table summarises the standard assessment tasks for this subject. Please note this is a guide only. Assessment tasks are regularly updated, where there is a difference your Learning Guide takes precedence.

| Type | Length | Percent | Threshold | Individual/ Group Task |
|---|---|---|---|---|
| Numerical Problem Solving | 75 minutes | 25 | N | Individual |
| Final Exam | 2 hours | 40 | N | Individual |
| Quiz | 30 minutes (per quiz) | 25 | N | Individual |
| Quiz | 10 minutes | 10 | N | Individual |

### External Students

The following table summarises the standard assessment tasks for this subject. Please note this is a guide only. Assessment tasks are regularly updated, where there is a difference your Learning Guide takes precedence.

| Type | Length | Percent | Threshold | Individual/ Group Task |
|---|---|---|---|---|
| Numerical Problem Solving | 75 minutes | 25 | N | Individual |
| Quiz | 30 minutes each for 5 online quizzes | 25 | N | Individual |
| Final Exam | 2 hours open book | 50 | Y | Individual |

### Autumn Hybrid

The following table summarises the standard assessment tasks for this subject. Please note this is a guide only. Assessment tasks are regularly updated, where there is a difference your Learning Guide takes precedence.

| Type | Length | Percent | Threshold | Individual/ Group Task |
|---|---|---|---|---|
| Numerical Problem Solving | 75 minutes | 25 | N | Individual |
| Quiz | 30 minutes (per quiz) | 25 | N | Individual |
| Final Exam | 2 hours open book | 40 | Y | Individual |
| Quiz | 10 minutes | 10 | N | Individual |

Prescribed Texts

- MacGillivray, H., Utts, J. M., & Heckard, R. F. (2014). *Mind on statistics* (2nd Australian & New Zealand ed.). Cengage Learning.

Teaching Periods

# Autumn (2024)

## Campbelltown

### Hybrid

**Subject Contact** Preethi Kottegoda (https://directory.westernsydney.edu.au/search/name/Preethi Kottegoda/)

View timetable (https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=MATH1003_24-AUT_CA_3#subjects)

## Hawkesbury

### Hybrid

**Subject Contact** Preethi Kottegoda (https://directory.westernsydney.edu.au/search/name/Preethi Kottegoda/)

View timetable (https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=MATH1003_24-AUT_HW_3#subjects)

## Parramatta - Victoria Rd

### Hybrid

**Subject Contact** Preethi Kottegoda (https://directory.westernsydney.edu.au/search/name/Preethi Kottegoda/)

View timetable (https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=MATH1003_24-AUT_PS_3#subjects)

# Spring (2024)

## Campbelltown

### On-site

**Subject Contact** Preethi Kottegoda (https://directory.westernsydney.edu.au/search/name/Preethi Kottegoda/)

View timetable (https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=MATH1003_24-SPR_CA_1#subjects)

## Hawkesbury

### On-site

**Subject Contact** Preethi Kottegoda (https://directory.westernsydney.edu.au/search/name/Preethi Kottegoda/)

View timetable (https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=MATH1003_24-SPR_HW_1#subjects)

## Parramatta - Victoria Rd

### On-site

**Subject Contact** Preethi Kottegoda (https://directory.westernsydney.edu.au/search/name/Preethi Kottegoda/)

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