STAT7830

Statistical Methods in Bioinformatics

Session 1, Weekday attendance, North Ryde 2020

Department of Mathematics and Statistics

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General Information

Unit convenor and teaching staff Unit Convenor/Lecturer Nino Kordzakhia nino.kordzakhia@mq.edu.au Contact via Email 12WW 610 please refer to iLearn
Credit points 10
Prerequisites Admission to MRes
Corequisites
Co-badged status STAT8830
Unit description This unit introduces the statistical and probabilistic concepts that are the basis for the study of bioinformatics. Topics include an introduction to probability and conditional probability, probability distributions, sampling distributions and an introduction to Markov processes. Particular attention is paid to how they relate to specific applications in the field of bioinformatics. A basic understanding of calculus will be an advantage.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at https://www.mq.edu.au/study/calendar-of-dates

Learning Outcomes

On successful completion of this unit, you will be able to:

ULO1: Communicate the knowledge of fundamentals of Probability and Statistics using specific terminology.

ULO2: Use relevant terminology and describe the distribution functions and characteristics of some discrete and continuous random variables.

ULO3: Evaluate probabilities of events, expected values andvariances of random variables.

ULO4: Apply statistical and probabilistic modelling approach to genetic data.

ULO5: Apply fundamental principles of statistical data analysis.

Assessment Tasks

Coronavirus (COVID-19) Update

Assessment details are no longer provided here as a result of changes due to the Coronavirus (COVID-19) pandemic.

Students should consult iLearn for revised unit information.

Find out more about the Coronavirus (COVID-19) and potential impacts on staff and students

General Assessment Information

ATTENDANCE and PARTICIPATION: If there are circumstances that mean you will miss a class, you can apply for Special Consideration via ask.mq.edu.au

ASSIGNMENT SUBMISSION: Assignment submission will be online through the iLearn page.

Submit assignments online via the appropriate assignment link on the iLearn page.

LATE SUBMISSION OF WORK: All assessment tasks must be submitted by the official due date and time. In the case of a late submission for a non-timed assessment (e.g. an assignment), if special consideration has NOT been granted, 20% of the earned mark will be deducted for each 24-hour period (or part thereof) that the submission is late for the first 2 days (including weekends and/or public holidays). For example, if an assignment is submitted 25 hours late, its mark will attract a penalty equal to 40% of the earned mark. After 2 days (including weekends and public holidays) a mark of 0% will be awarded. Timed assessment tasks (e.g. tests, examinations) do not fall under these rules.

Delivery and Resources

Coronavirus (COVID-19) Update

Any references to on-campus delivery below may no longer be relevant due to COVID-19.

Please check here for updated delivery information: https://ask.mq.edu.au/account/pub/display/unit_status

Classes

Lectures begin in Week 1. SGTA begin in Week 2.

Students must attend two hours of lectures and two hours of SGTA per week. The lecture notes will be made available on iLearn before the lecture.

SGTA exercises will be set weekly and will be available on iLearn before each class.

The timetable for classes can be found at http://www.timetables.mq.edu.au

iLearn

All unit related materials including lecture notes, SGTA's and instructions for assessment tasks and administrative updates, will be published on iLearn at

https://ilearn.mq.edu.au/login/

Software

The statistical software R will be used. This is a free software environment for statistical computing and graphics and can be downloaded from the website

http://www.r-project.org/

Texts and materials:

There is no required textbook for this unit.

Recommended reference sources:

1. W. P. Krijnen Applied Statistics for Bioinformatics using R, 2009: http://cran.r-project.org/doc/contrib/Krijnen-IntroBioInfStatistics.pdf
2. S. Draghici Statistics and Data Analysis for Microarrays Using R and Bioconductor. Chapman & Hall/CRC Mathematical and Computational Biology, 2nd Edition, 2012
3. P. N. Suravajhala. Your passport to a career in bioinformatics. New Delhi: Springer, 2013
4. W. J. Ewens and G. R. Grant. Statistical Methods in Bioinformatics, an Introduction. Springer, 2000
5. K. Lange. Mathematical and Statistical Methods for Genetic Analysis, Statistics for Biology and Health. Springer, 2002

Unit Schedule

Coronavirus (COVID-19) Update

The unit schedule/topics and any references to on-campus delivery below may no longer be relevant due to COVID-19. Please consult iLearn for latest details, and check here for updated delivery information: https://ask.mq.edu.au/account/pub/display/unit_status

Weeks	Lecture Topics	Due
W1	Introduction	
W2	Discrete random variables and their characteristics	

Weeks	Lecture Topics	Due
W3 - W5	Hardy-Weinberg Equilibrium (HWE); Departures from HWE; Statistical testing of HWE.	**Week 4** **Assignment 1**
W6 - W7	HWE for X-linked loci. Introduction to continuous random variables: Uniform Distribution.	
MID-SESSION BREAK		
W8	Continuous random variables and their characteristics	**Test**
W10 - W11	Hypothesis testing and its applications	**Week 11** **Assignment 2**
W12	Markov Chains and their applications	
W13		**Practical Test**

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- Academic Appeals Policy
- Academic Integrity Policy
- Academic Progression Policy
- Assessment Policy
- Fitness to Practice Procedure
- Grade Appeal Policy
- Complaint Management Procedure for Students and Members of the Public
- Special Consideration Policy *(**Note:** The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.)*

Students seeking more policy resources can visit the Student Policy Gateway (https://students.mq.edu.au/support/study/student-policy-gateway). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit Policy Central (https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/study/getting-started/student-conduct

Results

Results published on platform other than eStudent, (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in eStudent. For more information visit ask.mq.edu.au or if you are a Global MBA student contact globalmba.support@mq.edu.au

Student Support

Macquarie University provides a range of support services for students. For details, visit http://students.mq.edu.au/support/

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to help you improve your marks and take control of your study.

- Getting help with your assignment
- Workshops
- StudyWise
- Academic Integrity Module

The Library provides online and face to face support to help you find and use relevant information resources.

- Subject and Research Guides
- Ask a Librarian

Student Services and Support

Students with a disability are encouraged to contact the Disability Service who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

If you are a Global MBA student contact globalmba.support@mq.edu.au

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the Acceptable Use of IT Resources Policy.

The policy applies to all who connect to the MQ network including students.