



# ELEC881

## Telecommunications Performance Analysis

S2 Day 2016

*Dept of Engineering*

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#### **Disclaimer**

Macquarie University has taken all reasonable measures to ensure the information in this publication is accurate and up-to-date. However, the information may change or become out-dated as a result of change in University policies, procedures or rules. The University reserves the right to make changes to any information in this publication without notice. Users of this publication are advised to check the website version of this publication [or the relevant faculty or department] before acting on any information in this publication.

## General Information

Unit convenor and teaching staff

Rein Vesilo

[rein.vesilo@mq.edu.au](mailto:rein.vesilo@mq.edu.au)

Stephen Hanly

[stephen.hanly@mq.edu.au](mailto:stephen.hanly@mq.edu.au)

Lecturer

Philip Whiting

[philip.whiting@mq.edu.au](mailto:philip.whiting@mq.edu.au)

Contact via Email

E6B Level 1

Credit points

4

Prerequisites

Admission to MEng

Corequisites

Co-badged status

Unit description

Early telecommunication systems were mostly characterised by information bandwidth and noise. More recently, digital measures like bit error rate have progressed. More complicated performance analysis techniques are explored and developed in this unit to reflect the growing applications for telecommunications beyond basic voice, data, and video and how these combine and progress to a more robust specification for telecommunications performance.

## 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:

Demonstrate the ability to work at a theoretical and a computational level with random variables and probability.

Ability to write and evaluate the results of MATLAB simulation programs for elementary

random processes, such as Poisson process and renewal processes as well as simple systems e.g. Erlang-B, Erlang-C, M/M/1 and a closed queueing network.

Able to critically analyse technical literature, provide design alternatives and propose innovative solutions to problems in data communications and network performance evaluation

Ability to communicate technical information and results effectively including literature reviews.

Ability to approach engineering problems in a professional manner and have the capability for independent problem solving.

## General Assessment Information

### Notifications

Formal notification of assessment tasks, grading rubrics and due dates will be posted on iLearn. Although all reasonable measures to ensure the information is accurate, The University reserves the right to make changes without notice. Each student is responsible for checking iLearn for changes and updates.

### Report and Assignment Tasks

Assignment Problems will be posted on iLearn at least two weeks before their submission date. Assignment solutions will be posted within one week after the submission date. Submissions will not be accepted once the solution is posted. All assignments and reports must be submitted electronically through iLearn (in pdf format). Resubmissions will be permitted up to due date.

### Hurdle requirement

The final exam is a hurdle requirement because it is the only reliable assessment of individual performance for this unit. A passing grade of 50% or more in the final examination is a condition of passing this unit. Students who make a serious attempt but fail to meet the hurdle requirement will be given one further opportunity to pass. A serious attempt is defined as achievement of a mark of 40% or greater.

### Satisfactory performance

A mark of 50 or more is required to obtain a passing grade (P/CR/D/HD)

## Assessment Tasks

Name	Weighting	Due
<a href="#"><u>Assignment 0</u></a>	5%	Week 3
<a href="#"><u>Assignment 1</u></a>	25%	Week 6

Name	Weighting	Due
<a href="#">Assignment 2</a>	20%	Week 9
<a href="#">Assignment 3</a>	25%	Week 13
<a href="#">Final exam</a>	25%	End of year exam period

## Assignment 0

Due: **Week 3**

Weighting: **5%**

Early short diagnostic assignment

On successful completion you will be able to:

- Demonstrate the ability to work at a theoretical and a computational level with random variables and probability.
- Ability to write and evaluate the results of MATLAB simulation programs for elementary random processes, such as Poisson process and renewal processes as well as simple systems e.g. Erlang-B, Erlang-C, M/M/1 and a closed queueing network.
- Ability to communicate technical information and results effectively including literature reviews.
- Ability to approach engineering problems in a professional manner and have the capability for independent problem solving.

## Assignment 1

Due: **Week 6**

Weighting: **25%**

Assignment on Part 1

On successful completion you will be able to:

- Demonstrate the ability to work at a theoretical and a computational level with random variables and probability.
- Ability to write and evaluate the results of MATLAB simulation programs for elementary random processes, such as Poisson process and renewal processes as well as simple systems e.g. Erlang-B, Erlang-C, M/M/1 and a closed queueing network.
- Ability to communicate technical information and results effectively including literature reviews.
- Ability to approach engineering problems in a professional manner and have the

capability for independent problem solving.

## Assignment 2

Due: **Week 9**

Weighting: **20%**

Assignment on part 2

On successful completion you will be able to:

- Demonstrate the ability to work at a theoretical and a computational level with random variables and probability.
- Ability to write and evaluate the results of MATLAB simulation programs for elementary random processes, such as Poisson process and renewal processes as well as simple systems e.g. Erlang-B, Erlang-C, M/M/1 and a closed queueing network.
- Ability to communicate technical information and results effectively including literature reviews.
- Ability to approach engineering problems in a professional manner and have the capability for independent problem solving.

## Assignment 3

Due: **Week 13**

Weighting: **25%**

Assignment on Part 3

On successful completion you will be able to:

- Able to critically analyse technical literature, provide design alternatives and propose innovative solutions to problems in data communications and network performance evaluation
- Ability to communicate technical information and results effectively including literature reviews.
- Ability to approach engineering problems in a professional manner and have the capability for independent problem solving.

## Final exam

Due: **End of year exam period**

Weighting: **25%**

Closed book exam

On successful completion you will be able to:

- Demonstrate the ability to work at a theoretical and a computational level with random variables and probability.
- Able to critically analyse technical literature, provide design alternatives and propose innovative solutions to problems in data communications and network performance evaluation
- Ability to communicate technical information and results effectively including literature reviews.

## **Delivery and Resources**

### **Practical sessions**

There are eleven weekly laboratory sessions, starting in Week 2.

### **Late assignments**

Late assignments will be penalised 10% per day of lateness except if a request for extension based on medical or other exception circumstances is submitted (disruption to studies) and approved.

### **Technology used**

Library and internet search engines, word processing software, Matlab software.

### **Laboratory Safety**

No student will be permitted to enter the laboratory without proper footwear. THONGS OR SANDALS ARE NOT ACCEPTABLE. NO FOOD OR DRINK may be taken into the laboratory.

### **Text book**

There is no specified textbook. However there are a number of books covering basic probability, statistics and random processes in the library.

See iLearn for a list of suitable textbooks.

### **Lecture and laboratory notes**

Lecture notes, laboratory notes, workshop notes, assignments and resources are provided online through iLearn.

## **Unit Schedule**

Please see ilearn for the unit schedule.

## **Policies and Procedures**

Macquarie University policies and procedures are accessible from [Policy Central](#). Students

should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy [http://mq.edu.au/policy/docs/academic\\_honesty/policy.html](http://mq.edu.au/policy/docs/academic_honesty/policy.html)

**New Assessment Policy in effect from Session 2 2016** [http://mq.edu.au/policy/docs/assessment/policy\\_2016.html](http://mq.edu.au/policy/docs/assessment/policy_2016.html). For more information visit [http://students.mq.edu.au/events/2016/07/19/new\\_assessment\\_policy\\_in\\_place\\_from\\_session\\_2/](http://students.mq.edu.au/events/2016/07/19/new_assessment_policy_in_place_from_session_2/)

Assessment Policy prior to Session 2 2016 <http://mq.edu.au/policy/docs/assessment/policy.html>

Grading Policy prior to Session 2 2016 <http://mq.edu.au/policy/docs/grading/policy.html>

Grade Appeal Policy <http://mq.edu.au/policy/docs/gradeappeal/policy.html>

Complaint Management Procedure for Students and Members of the Public [http://www.mq.edu.au/policy/docs/complaint\\_management/procedure.html](http://www.mq.edu.au/policy/docs/complaint_management/procedure.html)

Disruption to Studies Policy [http://www.mq.edu.au/policy/docs/disruption\\_studies/policy.html](http://www.mq.edu.au/policy/docs/disruption_studies/policy.html) *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

In addition, a number of other policies can be found in the [Learning and Teaching Category](#) of 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/support/student\\_conduct/](https://students.mq.edu.au/support/student_conduct/)

## **Results**

Results shown in *iLearn*, 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](http://ask.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](http://mq.edu.au/learningskills)) provides academic writing resources and study strategies to improve your marks and take control of your study.

- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module for Students](#)
- [Ask a Learning Adviser](#)

## 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](http://ask.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/](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.

## Graduate Capabilities

### PG - Capable of Professional and Personal Judgment and Initiative

Our postgraduates will demonstrate a high standard of discernment and common sense in their professional and personal judgment. They will have the ability to make informed choices and decisions that reflect both the nature of their professional work and their personal perspectives.

This graduate capability is supported by:

#### Learning outcomes

- Ability to write and evaluate the results of MATLAB simulation programs for elementary random processes, such as Poisson process and renewal processes as well as simple systems e.g. Erlang-B, Erlang-C, M/M/1 and a closed queueing network.
- Able to critically analyse technical literature, provide design alternatives and propose innovative solutions to problems in data communications and network performance evaluation
- Ability to communicate technical information and results effectively including literature reviews.
- Ability to approach engineering problems in a professional manner and have the capability for independent problem solving.

#### Assessment tasks

- Assignment 1
- Assignment 2
- Assignment 3



## PG - Discipline Knowledge and Skills

Our postgraduates will be able to demonstrate a significantly enhanced depth and breadth of knowledge, scholarly understanding, and specific subject content knowledge in their chosen fields.

This graduate capability is supported by:

### Learning outcomes

- Demonstrate the ability to work at a theoretical and a computational level with random variables and probability.
- Ability to write and evaluate the results of MATLAB simulation programs for elementary random processes, such as Poisson process and renewal processes as well as simple systems e.g. Erlang-B, Erlang-C, M/M/1 and a closed queueing network.
- Able to critically analyse technical literature, provide design alternatives and propose innovative solutions to problems in data communications and network performance evaluation

### Assessment tasks

- Assignment 0
- Assignment 1
- Assignment 2
- Assignment 3
- Final exam

## PG - Critical, Analytical and Integrative Thinking

Our postgraduates will be capable of utilising and reflecting on prior knowledge and experience, of applying higher level critical thinking skills, and of integrating and synthesising learning and knowledge from a range of sources and environments. A characteristic of this form of thinking is the generation of new, professionally oriented knowledge through personal or group-based critique of practice and theory.

This graduate capability is supported by:

### Learning outcomes

- Demonstrate the ability to work at a theoretical and a computational level with random variables and probability.
- Ability to write and evaluate the results of MATLAB simulation programs for elementary random processes, such as Poisson process and renewal processes as well as simple systems e.g. Erlang-B, Erlang-C, M/M/1 and a closed queueing network.
- Able to critically analyse technical literature, provide design alternatives and propose

innovative solutions to problems in data communications and network performance evaluation

## **Assessment tasks**

- Assignment 0
- Assignment 1
- Assignment 2
- Assignment 3
- Final exam

## **PG - Research and Problem Solving Capability**

Our postgraduates will be capable of systematic enquiry; able to use research skills to create new knowledge that can be applied to real world issues, or contribute to a field of study or practice to enhance society. They will be capable of creative questioning, problem finding and problem solving.

This graduate capability is supported by:

### **Learning outcomes**

- Demonstrate the ability to work at a theoretical and a computational level with random variables and probability.
- Ability to write and evaluate the results of MATLAB simulation programs for elementary random processes, such as Poisson process and renewal processes as well as simple systems e.g. Erlang-B, Erlang-C, M/M/1 and a closed queueing network.
- Able to critically analyse technical literature, provide design alternatives and propose innovative solutions to problems in data communications and network performance evaluation

## **Assessment tasks**

- Assignment 0
- Assignment 1
- Assignment 3
- Final exam

## **PG - Effective Communication**

Our postgraduates will be able to communicate effectively and convey their views to different social, cultural, and professional audiences. They will be able to use a variety of technologically supported media to communicate with empathy using a range of written, spoken or visual formats.

This graduate capability is supported by:

## Learning outcomes

- Demonstrate the ability to work at a theoretical and a computational level with random variables and probability.
- Ability to write and evaluate the results of MATLAB simulation programs for elementary random processes, such as Poisson process and renewal processes as well as simple systems e.g. Erlang-B, Erlang-C, M/M/1 and a closed queueing network.
- Able to critically analyse technical literature, provide design alternatives and propose innovative solutions to problems in data communications and network performance evaluation
- Ability to communicate technical information and results effectively including literature reviews.

## Assessment tasks

- Assignment 0
- Assignment 1
- Assignment 2
- Assignment 3
- Final exam

## PG - Engaged and Responsible, Active and Ethical Citizens

Our postgraduates will be ethically aware and capable of confident transformative action in relation to their professional responsibilities and the wider community. They will have a sense of connectedness with others and country and have a sense of mutual obligation. They will be able to appreciate the impact of their professional roles for social justice and inclusion related to national and global issues

This graduate capability is supported by:

## Learning outcomes

- Able to critically analyse technical literature, provide design alternatives and propose innovative solutions to problems in data communications and network performance evaluation
- Ability to approach engineering problems in a professional manner and have the capability for independent problem solving.

## Assessment task

- Assignment 3

## Changes from Previous Offering

This is the first time this unit is being offered.