Graduate School of Biomedical

UNSW Engineeri

BIOM9621

Biological Signal Analysis

Term 3, 2021

Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
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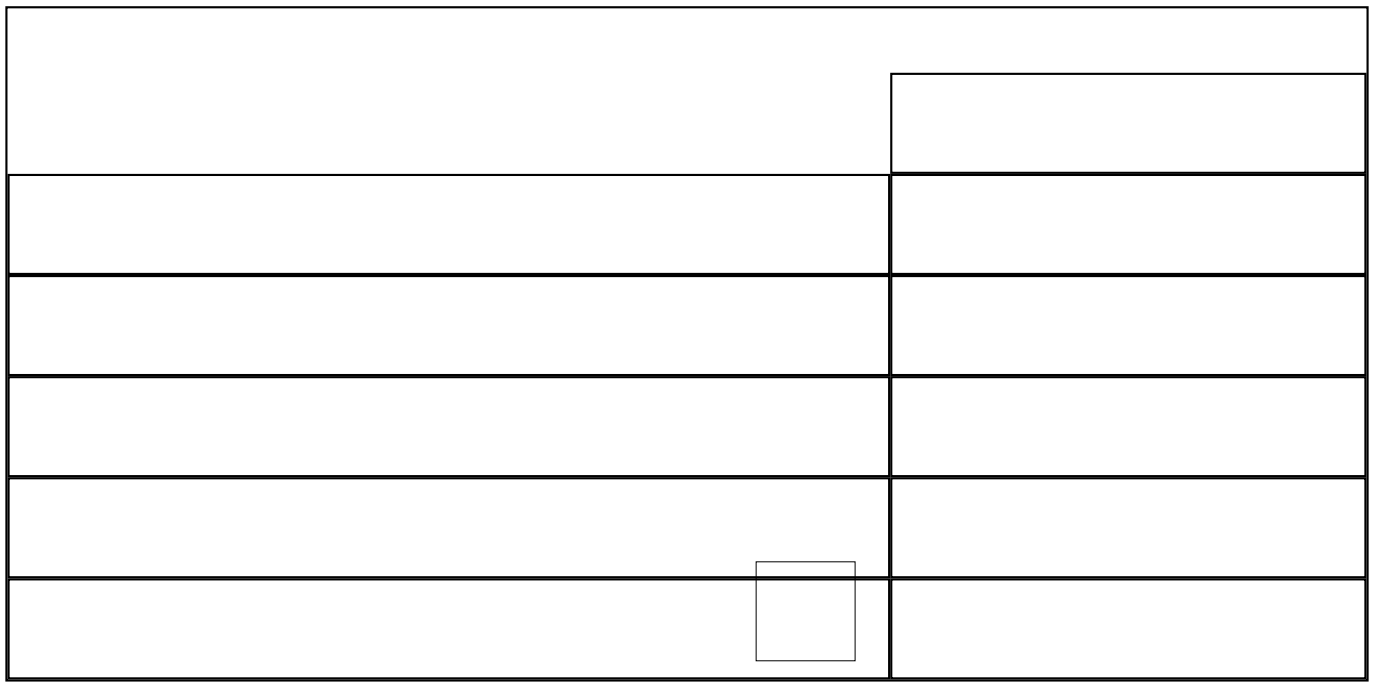

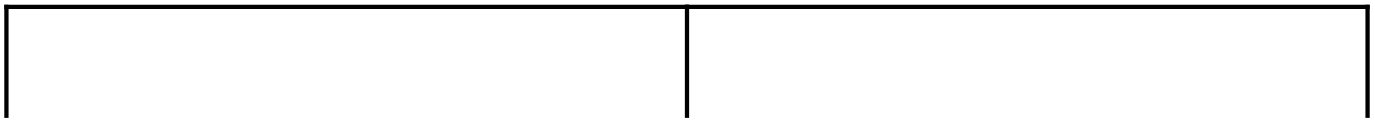

	activity is compulsory (2% of assessm the course you will also need to deve programming skills using Matlab onra be required to compete the Matlab qu assessment).
Lectures	Each week there will be a short lectu approximately one hour duration, foll a tutorial or a laboratory session (so
Tutorials	The tutorial/laboratory session aims t how to apply signal theory to practica
Assessments	The assignment (15%) will help reinfo extend your knowledge in analog and processing. We advise that you use th assignment to discover your areas of that you may study more effectively.
Laboratory Work	The practical component of this cours you how to use a signal generator, os and simple RC circuit. You will also d to analyse the frequency content of a The two lab reports will be worth 16% assessment.
Group work	You will attempt to design a mechanic controller to support patients with Co failure. In week 10 you will present y class. You will also hand in individua

Additional Course Information

Presumed knowledge and skills

It is expected that the student has completed one year of university m Integral calculus and complex numbers will play a particularly importa experience in computing (any language) is desirable but not required. Matlab and Simulink will be provided.

How BIOM9621 relates to other courses

This course is offered in the various biomedical engineering masters p BIOM9640 Biomedical Instrumentation and BIOM9650 Biosensors and T

BIOM9621 focuses on the data acquisition process itself, the conversi to digital form, and on some of the numerical methods used to analyse

BIOM9640 is an introduction to the physiological measurement of bioe neurostimulation and the instrumentation involved. BIOM9650 examine transducers used to measure pressure, flow, volume and other physiol

Course content

Introduction to biomedical signal analysis	What are biological signals?
	Some applications of biological signal analysis
	Overview of course
	Simulink and Matlab overview
Linear time invariant systems I	Maths revision
	Definition of a LTI system

Assessment

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Online Maths and Matlab Revision Quizzes	4%	29/09/2021 12:00 AM	1, 2, 3, 4, 5, 6
2. Major topic online quizzes	50%	Not Applicable	2, 5
3. Lab reports	16%	10/11/2021 12:00 AM	2, 3, 4, 5, 6
4. Group project. Development of a mechanical ventilator controller to support respiratory failure in COVID patients	15%	Not Applicable	
5. Major Assignment	15%	17/11/2021 12:00 AM	2, 4, 5

Assessment 1: Online Maths and Matlab Revision Quizzes

Due date: 29/09/2021 12:00 AM

These quizzes will assess Maths and Matlab prerequiwET8s wfu0gq011.03

Criteria	Mark
x number of patients that survive for your simulation(s), M highest num patients saved for all simulations, m lowest number of patients saved all simulations	(x - m)/(M - m)

e) reflection on how well the team worked together including your role

Criteria	Mark
Does not provide roles and responsibilities of group members, and wh achieved as a group. No contribution to group work	0
Provides roles and responsibilities of group members and provides wh member contributed to the group output. Minor contribution to group w	0.5
Comments on potential shortcomings of teamwork and how to form an medical device R&D team in the future. A significant contribution to g	1

f) additional analysis or refinement or value-add to the group s output conducted by yourself. (2 marks)

Criteria	Mark
Does not report what was shared between group members, and acknow the contribution of individual members	0
Resolves additional minor issues not solved by the group e.g., enhanc literature review	1
Resolves additional major issues not solved by the group e.g., modifi controller design to increas0.000ntroller design to increas0.000ntroller de	2

Attendance Requirements

Students are strongly encouraged to attend all classes and review lec

Course Schedule

Contact hours	3 hours per week	
Lecture	Thursday 10:00 am (online)	11:00 am
Tutorial/Laboratory	Thursday 11:00 am (online)	1:00 pm
Online Activities	3 hours	

View class timetable

Timetable

Date	Type	Content
Week 1: 13 September - 17 September	Online Activity	

eETOtrs 17 September

	Online Activity	Digital acquisition of signals and fre domain analysis (Tutorial)
	Online Activity	Estimate Fourier series coefficients f pulse waveform (demonstration)
Week 6: 18 October - 22 October	Online Activity	Medical Device Design (RN/RA)
	Group Work	Group formation, project selection (s allocation of roles and responsibilitie of signal for the project (supplied).
Week 7: 25 October - 29 October	Online Activity	z-transform and introduction to digita Using Matlab to design digital filters
	Online Activity	Evaluating z-functions on the unit cir zero-padding. Explore the effects of Ad-hoc filter design and difference e implementation. FIR and IIR filter de (Tutorial)
Week 8: 1 November - 5 November	Online Activity	PID control (RA). Using Matlab/Simul and tune control system
	Online Activity	Ziegler-Nichols tuning of PID control
	Online Activity	Matlab exercises (Practical)
Week 9: 8 November - 12 November	Online Activity	Sampling and spectral analysis of bio signals (RA)
	Online Activity	Periodogram and short time Fourier t (tutorial)
	Online Activity	Digital sampling online quiz 10-11 am
Week 10: 15 November - 19 November	Group Activity	Medical Device Design and Analysis (presentations) Groups present their medical device concept and simulate its performance
	Online Activity	z-transform and introduction and digi online quiz 10-11 am (10%)

Resources

Prescribed Resources

All material will be provided via Moodle. Teams tutorials will be recor

Recommended Resources

DATES TO NOTE

Refer to MyUNSW for [Important Dates](#).

PLAGIARISM

Beware! An assignment that includes plagiarised material will receive
plagiarise may fail the course. Students who plagiarise will have their
register and will be liable to disciplinary action, including exclusion f

It is expected that all students must at all times submit their own work
work or ideas of someone else without clearly acknowledging the sourc
is plagiarism.

All assessments which you have to submit must have the [Non Plagiarism Declaration](#). This is for
both individual and group work. Attach it to your assignment before s
Coordinator or at the School Office.

Plagiarism is the use of another person s work or ideas as if they wer
desirable to use other people s material you should adequately acknow
are and where you found them (giving the complete reference details,
Learning Centre provides further information on what constitutes Plag

https://student.unsw.edu.au/plagiarism

ACADEMIC ADVICE

Last year we had problems with contract cheating and sharing of ass
serious breaches of academic conduct. Please read and the [student academic misconduct procedure](#).
It is expected that students attend all lectures and tu

Assignments submitted after the due date without prior notification an
deduction in marks.

UNSW has a wide range of student support services. The resources li
students needing assistance related to aspects of their overall Univer
regarding this course can be sought from the course coordinator.

http://www.student.unsw.edu.au/

https://my.unsw.edu.au/student/howdoi/HowDoI_MainPage.html

http://www.counselling.unsw.edu.au/

Those students who have a disability that requires some adjustment in environment are encouraged to discuss their study needs with the cou commencement of, their course by visiting Disability Support Services to be discussed ma include access to materials, signers or note-takers, the provision of s assessment arrangements. Early notification is essential to enable ar made.

If you believe that your performance in an assessable component of th illness or another unexpected circumstance, you should make an appli soon as possible after the event by visiting UNSW Student Central. P coordinator as well and note that considerations are not granted autor

UNSW has strict policies and expectations relating to Occupational He at http://www.ohs.unsw.edu.au/

Course Evaluation and Development

Student feedback has helped to shape and develop this course, includ line evaluations as part of UNSW s Course and Teaching Evaluation and process. To discourage cheating and encourage independent problem-s the percentage of assessment contributed by the final exam.

Laboratory Workshop Information

Face-to-face labs will be replaced by online demonstrations. I will ger need to analyse for your individual reports.

Submission of Assessment Tasks

Laboratory reports and major assignments will require a Non-Plagiarism Declaration Cover S

Late submissions will be penalised 10% of the mark for each calendar
in meeting the nominated submission date please contact the Course C
to discuss your situation as soon as possible.

Academic Honesty and Plagiarism

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Academic Information

COURSE EVALUATION AND DEVELOPMENT

Student feedback has helped to shape and develop this course, includ
line evaluations as part of UNSW s as part of UNSW s myExperience p
encouraged to complete such an on-line evaluation toward the end of
provided will be important in improving the course for future students.

DATES TO NOTE

Refer to MyUNSW for Important Dates, available at:
https://my.unsw.edu.au/student/resources/KeyDates.html

ACADEMIC ADVICE

For information about:

- Notes on assessments and plagiarism,
- Special Considerations,
- School Student Ethics Officer, and
- BESS

refer to the School website available at
http://www.engineering.unsw.edu.au/biomedical-engineering/

Supplementary Examinations:

Supplementary Examinations for Term 3 2021 will be held on Monday 1
January (inclusive) should you be required to sit one.

Image Credit

Engraved portrait of French mathematician Jean Baptiste Joseph Fouri
century.

CRICOS

CRICOS Provider Code: 00098G

Acknowledgement of Country

We acknowledge the Bedegal people who are the traditional custodians
Kensington campus is located.

Appendix: Engineers Australia (EA) Professional En Standard

Program Intended Learning Outcomes	
Knowledge and skill base	P
PE1.1 Comprehensive, theory based understanding of the un'derpinnin physical sciences and the engineering fundamentals applicable to the	
PE1.2 Conceptual understanding of the mathematics, numeri'cal analys computer and information sciences which underpin the engineering dis	
PE1.3 In-depth understanding of specialist bodies of knowledge within discipline	