

INSTRUCTORS

- Dr. Ahmad Haidar (ahmad.haidar@mcgill.ca)
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Office hours

- By arrangement

COURSE STRUCTURE

- 2 lectures of 90 minutes/week
- 6 assignments
- 4 presentations
- Final project

REFERENCE TEXTS

- Ljung L. (1987) System Identification for the User. Prentice-Hall, Engewood Cliffs, New Jersey.
- Westwick D.T., Kearney R.E. (2003) Identification of Nonlinear Physiological Systems: Theory and Practice. IEEE Book Series in Biomedical Engineering, IEEE Press
- Bendat J.S., Piersol A.G. (1985) *Random Data: Analysis and Measurement Procedures (Second edition)*,. Wiley-Interscience, New York

COMMUNICATION

myCourses Discussion group

- Preferred method for out-of-class communication
- If you have questions regarding course material it is most likely that others will as well. Using the discussion group will allow others to learn from your question.

E-mail

- Use for personal issues

BMDE 502: Biomedical Modelling & Identification
Course Information 2023

502 Assignment Topics	
Assignment Number	Topic
1	Linear non-parametric identification
2	Linear parametric identification
3	Simulation of Glucose-insulin system
4	Maximum likelihood estimation /Least squares
5	Deconvolution
6	Practical Identification
7	PK Modelling
8	Deconvolutionn
9	Nonlinear identification

502 Presentation Topics	
Assignment Number	Topic
1	Linear system identification
2	Linear parametric identification
3	Nonlinear identification
4	Project proposal

EVALUATION

- 8 Assignments 48 %
- 3 in class presentations: 21 %
- Take home Exam : 31%

Assignments (8 @ 6% = 48 %)

One assignment will be due every two weeks where the students will use Matlab and the `nlid_toobox` to carry out modelling and identification exercises. Topics for assignments will be:

1. Nonparametric Identification of a linear systems (RK)
2. Parametric Identification of a linear system & model order determination (RK)
3. Simulation of a system from a block diagram (insulin control) (AH)
4. Nonlinear minimization for parameter estimation (AH)
5. Deconvolution for input estimation (AH)
6. Identification of a block structured nonlinear system (RK)

Late assignments will be penalized 0.5% for each day.

Presentations (4@7% = 28%)

- Students will select and present a paper illustrating the topics related to the course. Details of the topics to be discussed will be posted on the MyCourses Assignments.
- Papers should be posted on MyCourses at least 3 days before the presentation so that all members of the class can review them.
- You are expected to prepare a set of slides to support your presentation. These must be submitted via MyCourses/Assignments the day before the presentation.
- Presentations will be graded on a scale of 0-10; each presentation will be worth 7% of the final grade.

Presentation Content

Each presentation should last no more than 10 minutes with an additional five minutes for discussion. The presentation should cover the following:

- Background knowledge (physiology, clinical).
- State why this work is important (rationale, etc).
- Show model.
- If there is real or simulated clinical data, present in detail.
- Explain modelling/identification method.
- Summarize results.
- What are the limitations of the work.

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- Any other discussion.

Presentation Evaluation:

- Presenting students will be graded on the quality of the presentation, their understanding of the material, and ability explain it and answer questions.
- Each presentation will be graded between 0 and 10 as follows:

Item	Descriptions	Score
Timing	The presentation should last between 9-10 minutes	1
Introduction	The introduction should describe the presentation topic clearly in an attention-getting manner and should establish a framework for the rest of the presentation.	1
Sequence	The material must be presented in a logical sequence	1
Eye contact	Maintain eye contact with all class members to engage them. Do not read the slides with no eye contact or look only at the instructor. .	1
Slides	Slides must be clear, easy to read, be numbered, and not overly complex. (Exceptions will be made if you are putting too much information for illustrative purposes). The number of slides must be appropriate	1
Explanation	Explain/define technical/clinical/methodological terms when they are introduced in a language understood by most of the class.	1
Conclusion	Summarize the presentation and provide the take home message your presentation.	2.0
Critical Sense	Demonstrate that you understand the material and appreciate its strong and weak points.	2.0
	Total:	10

- We will be very reasonable with the grading. The intention is to ensure that we learn something out of each other presentations and hopefully help f you improve your critical sense and presentation skills.

Take Home Exam (30%)

- Each student will choose a nonlinear biomedical system and build a simulation model that makes reasonable assumptions about the system dynamics, parameters, and noise. Simulate its response and attempt to identify its structure and parameters using appropriate linear and nonlinear methods.
- End of exam period

ACADEMIC INTEGRITY

McGill University values academic integrity. Therefore all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures.

See <http://www.mcgill.ca/integrity/> for more information.

Academic Integrity: Assignments

- Students are encouraged to discuss the assignments in class, with the instructors, and with each other.
- Students are expected to carry out the analysis and write-up of the assignments independently.
- Some sharing of material, such as a MATLAB function developed jointly, may be appropriate provided that
 - It is a minor component of the assignment
 - All students involved consent to the sharing
 - The contributions of all students involved must be explicitly described

LANGUAGE OF SUBMISSION

- *In accord with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded.*
- *"Conformément à la Charte des droits de l'étudiant de l'Université McGill, chaque étudiant a le droit de soumettre en français ou en anglais tout travail écrit devant être noté (sauf dans le cas des cours dont l'un des objets est la maîtrise d'une langue)."*

EXTRAORDINARY CIRCUMSTANCES

- *In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change*