UNIVERSITY of GUELPH

ENGG*2400 Engineering Systems Analysis

01

Fall 2023

Section(s): C01

School of Engineering

Credit Weight: 0.50

Version 1.00 - September 01, 2023

_____

1 Course Details

1.1 Calendar Description

This course provides the foundational skills required to model and analyze elementary dynamic engineering systems. The course will focus on basic mechanical, electrical, thermal and hydraulic systems under the assumptions of linearity and time invariance. Students will learn to identify relevant elements and generate system models. System behaviours will be analyzed by solving for such responses as the impulse response, step response, and sinusoidal steady-state response using differential equations, Laplace transform methods, and computer-based methods. The relationship of such system parameters as time constant, degree of damping and resonance frequencies with the transient and steady-state responses will be examined. The complex valued system transfer function will be defined and analyzed.

Pre-Requisites:	ENGG*1210, ENGG*1500, MATH*1200, MATH*1210, PHYS*1010
Co-Requisites:	MATH*2270
Restrictions:	Non-BENG students may take a maximum of 4.00 ENGG credits.

1.2 Timetable

Times are subject to change. Please see WebAdvisor for the latest information.

1.3 Final Exam

Saturday, December 9th: 8:30 - 10:30 AM.

Exam time is subject to change. Please see WebAdvisor for the latest information.

_____

2 Instructional Support

2.1 Instructional Support Team

Instructor:	Cam Farrow
Email:	cfarrow@uoguelph.ca
Telephone:	+1-519-824-4120 x53838
Office:	RICH 1515

Instructor:	Julie Vale
Email:	jvale@uoguelph.ca
Telephone:	+1-519-824-4120 x54863
Office:	THRN 2340

2.2 Teaching Assistants

Teaching Assistant (GTA):	Roshan Aggarwal
Email:	roshan@uoguelph.ca

Teaching Assistant (GTA):	Asif Ali
Email:	aali38@uoguelph.ca

Teaching Assistant (GTA):	Shadman Monir Anto
Email:	antos@uoguelph.ca

Teaching Assistant (GTA):	Emanuel Figetakis
Email:	efigetak@uoguelph.ca

Teaching Assistant (GTA):	Zachary Kanmacher
Email:	zkanmach@uoguelph.ca

Teaching Assistant (GTA):	Marziyeh Karandish
Email:	mkarandi@uoguelph.ca

Teaching Assistant (GTA):	Troy Kozlowski
Email:	tkozlows@uoguelph.ca

Teaching Assistant (GTA):	Christina Zeuner
Email:	czeuner@uoguelph.ca

_____

3 Learning Resources

3.1 Required Resources

Textbook (Textbook)

Yang & Abramova, *Modeling and Analysis of Dynamic Systems: Modeling, Simulation and Analysis*, First Edition, Cambridge University Press, 2022.

Course Website (Website)

https://courselink.uoguelph.ca
Course material, news, announcements, and grades will be regularly posted to the
ENGG*2400 Courselink site. You are responsible for checking the site daily

3.2 Communication & Email Policy

As per university regulations, all students are required to check their uoguelph.ca e-mail
account regularly: e-mail is the official route of communication between the University and its
students.

It is your responsibility to abide by the following guidelines for all email correspondence:

- Send all emails from your uoguelph.ca e-mail account.
- Include the course code "ENGG*2400" in the subject line of all emails.
- Use a professional tone and appropriate etiquette in all your correspondence. This
  includes addressing the email using the correct salutation (correct name and correct
  title).
- Before emailing a GTA or the instructor with a question, check the course outline
  and Courselink FAQ/announcements/newsfeed to see if your question has already
  been answered there.

Failure to follow these guidelines may result in your email being disregarded.

Important: Unprofessional emails will not be responded to. This includes those using l33t,
text messaging shorthand, a complete lack of punctuation or capitals, etc. Furthermore,
Miss., Mrs., Ms., and Mr. are inappropriate forms of address for any staff or faculty member
who has a PhD. When communicating with a course instructor, (verbally or via email), please
use

- Julie, Dr. Vale, or Professor
- Cam, Dr. Farrow, or Professor

Emails using Miss., Mrs., Ms., or Mr. will not be responded to.

For all correspondence satisfying the above guidelines, the instructor and TAs will abide by
the following guidelines:

- Respond to questions within 24 hours on weekdays. Do not expect replies on evenings,
  holidays, or weekends.
- Use a professional tone and appropriate etiquette in all correspondence

Occasionally, an email may get missed, especially during busy times in the term. If you have
not received a timely reply and you are confident that you have abided by all of the guidelines
above, we apologize. Please resend your email and we will try to respond to it immediately.

4 Learning Outcomes

4.1 Course Learning Outcomes

By the end of this course, you should be able to:

1. Identify and defend assumptions and simplifications in constructing an engineering model
2. Identify suitable elements to represent physical devices
3. Identify appropriate through and across variables for a system model
4. Construct graphs or free body diagrams as graphical representations of a system model
5. Create a mathematical model through node analysis
6. Formulate time domain and Laplace domain mathematical models of a system and use computer based methods to simulate them
7. Solve system responses for first order and second order models
8. Solve for step, impulse, and frequency response
9. Assess the entire solution in the context of the problem domain

4.2 Engineers Canada - Graduate Attributes (2018)

Successfully completing this course will contribute to the following:

#	Outcome	Learning Outcome
1	Knowledge Base	2, 3, 4, 5, 6, 8
1.3	Recall, describe and apply fundamental engineering principles and concepts	2, 3, 4, 5, 6, 8
2	Problem Analysis	1, 2, 4, 5, 6, 7, 8, 9
2.2	Identify, organize and justify appropriate information, including assumptions	1, 2
2.3	Construct a conceptual framework and select an appropriate solution approach	1, 2, 4, 5
2.4	Execute an engineering solution	5, 6, 7, 8, 9
2.5	Critique and appraise solution approach and results	9
5	Use of Engineering Tools	6
5.2	Demonstrate proficiency in the application of selected engineering tools	6

5 Teaching and Learning Activities

Lecture schedule is tentative and subject to change

5.1 Lecture

Topics:	**Lectures 1-14: First Order Systems** -Modeling of first order systems (electrical, hydraulic and thermal), including interconnected systems -First order system response analysis, including step, impulse, free, forced, and complete responses
Topics:	**Lectures 15-28: Frequency Response, Second Order Systems and Advanced Responses** -Frequency responses -Second order system modelling, including mechanical systems, inertiance and state space -Second order responses, including the characteristic polynomial, damping
Topics:	**Lectures 29-36: Second Order Frequency Response, Laplace Transform, Rotational Mechanical Systems, Advanced System Analysis** -Transfer functions -Black box modelling -Second order frequency responses -Advanced and interconnected systems, including rotational mechanical systems

5.2 Other Important Dates

Please see the schedule of dates for other important dates in the academic year:
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c03/index.shtml

6 Assessments

6.1 Marking Schemes & Distributions

The course survey weight is 5%. The final exam weight is at least 50%, and may increase depending on performance on the midterm. The following applies:

If the midterm grade is <u>higher </u>than the final exam, the midterm will be weighted as 30%. If the midterm grade is <u>lower </u>than the final exam, the midterm will be weighted as 0% and the remaining weight will be placed on the final exam.

Name	Scheme A (%)	Scheme B (%)
Course Surveys	5	5
Quiz 1	7.5	7.5
Quiz 2	7.5	7.5
Midterm	30	0
Final	50	80
Total	100	100

6.2 Assessment Details

Course Feedback Surveys (5%)
Date: , Online Quiz
Surveys are conducted during weeks 1, 4, 8, and 11 and are submitted online. Each survey will be open for 5 days. Each survey is worth 1.25%.

You must complete your survey during the allotted time period. Late survey responses will not be accepted. Please e-mail Julie with any questions regarding survey access issues. Survey weight will not be shifted to the final exam.

Quiz 1 (7.5%)
Date: Week 3
Learning Outcome: 1, 2, 3, 4, 5, 6, 7, 8, 9

Quizzes will be held during tutorial (Sept. 25 - Sept. 29). Ensure you attend your scheduled tutorial section for quizzes.

If you miss your quiz you will have the opportunity to complete a make-up quiz week 5 during any of the scheduled tutorial sections:

Wednesday, October 11th: 10:30-11:20 AM - ALEX 218

Wednesday, October 11th: 5:30-6:20 PM - MCKN 223

Friday, October 13th: 8:30-9:20 - ALEX 218

Friday, October 13th: 10:30-11:20 - ALEX 218

If you miss both the regularly scheduled quiz and the make-up quiz, strong documentation will be required to request alternative options. Quiz weight will not be shifted to the final exam. Please e-mail Cam for any questions regarding quiz accommodations.

Midterm (30%)
  Date: Sat, Oct 28
  Learning Outcome: 1, 2, 3, 4, 5, 6, 7, 8, 9
  Saturday, October 28th: 9:00-11:00 AM

  ROZH 104

  Note that the midterm location is subject to change. Please see Courselink for updates.

  If you miss the midterm for any reason, the weight of the midterm will be shifted to the final exam. There will be no make-up midterm.

Quiz 2 (7.5%)
  Date: Week 10
  Quizzes will be held during tutorial (Nov. 13 - Nov. 17). Ensure you attend your scheduled tutorial section for quizzes.

  If you miss your quiz, you will have the opportunity to complete the quiz week 12 during any of the scheduled tutorial sections:

  Monday, November 27th: 10:30-11:20 ALEX 218

  Monday, November 27th: 12:30-1:20 ALEX 218

  Monday, November 27th: 2:30-3:20 ALEX 218

  Monday, November 27th: 4:30-5:20 ALEX 218

  Wednesday, November 29th: 10:30-11:20 AM - ALEX 218

Wednesday, November 29th: 5:30-6:20 PM - MCKN 223

If you miss both the regularly scheduled quiz and the make-up quiz, strong documentation will be required to request alternative options. Quiz weight will not be shifted to the final exam. Please e-mail Cam for any questions regarding quiz accommodations.

Final Exam (50%)
Date: Sat, Dec 9, 8:30 AM - , 10:30 AM
Learning Outcome: 1, 2, 3, 4, 5, 6, 7, 8, 9
Accommodation for missed final exams is not under the purview of the course instructors. If you miss the final exam and need advice on how to proceed, please contact the Engineering Program Counselors office.

6.3 Course Grading Policies

Accommodation of Religious Obligations: If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor within two weeks of the start of the semester to make alternate arrangements. See the undergraduate calendar for information on regulations and procedures for Academic Consideration of Religious Obligations:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-accomrelig.shtml 2

Missed midterm tests: If the midterm is missed for any reason, the weight of the missed midterm will be added to the final exam weight. There will be no makeup midterm

Passing Grade: As per University policy, the minimum passing grade is 50%

_____

7 School of Engineering Statements

7.1 Instructor's Role and Responsibility to Students

The instructor's role is to develop and deliver course material in ways that facilitate learning for a variety of students. Selected lecture notes will be made available to students on Courselink but these are not intended to be stand-alone course notes. Some written lecture notes will be presented only in class. During lectures, the instructor will expand and explain the content of notes and provide example problems that supplement posted notes. Scheduled classes will be the principal venue to provide information and feedback for tests and labs.

7.2 Students' Learning Responsibilities

Students are expected to take advantage of the learning opportunities provided during lectures and lab sessions. Students, especially those having difficulty with the course content, should also make use of other resources recommended by the instructor. Students who do

(or may) fall behind due to illness, work, or extra-curricular activities are advised to keep the instructor informed. This will allow the instructor to recommend extra resources in a timely manner and/or provide consideration if appropriate.

7.3 Lab Safety

Safety is critically important to the School and is the responsibility of all members of the School: faculty, staff and students. As a student in a lab course you are responsible for taking all reasonable safety precautions and following the lab safety rules specific to the lab you are working in. In addition, you are responsible for reporting all safety issues to the laboratory supervisor, GTA or faculty responsible.

8 University Statements

8.1 Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

8.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Graduate Calendar - Grounds for Academic Consideration
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions
https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml

8.3 Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml

Graduate Calendar - Registration Changes
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-

regchg.shtml

Associate Diploma Calendar - Dropping Courses
https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml

8.4 Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

8.5 Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to make a booking at least 14 days in advance, and no later than November 1 (fall), March 1 (winter) or July 1 (summer). Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time.

For Guelph students, information can be found on the SAS website
https://www.uoguelph.ca/sas

For Ridgetown students, information can be found on the Ridgetown SAS website
https://www.ridgetownc.com/services/accessibilityservices.cfm

8.6 Academic Integrity

The University of Guelph is committed to upholding the highest standards of academic integrity, and it is the responsibility of all members of the University community-faculty, staff, and students-to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff, and students have the responsibility of supporting an environment that encourages academic integrity. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be

construed as an academic offence should consult with a faculty member or faculty advisor.

Undergraduate Calendar - Academic Misconduct
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

Graduate Calendar - Academic Misconduct
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

8.7 Recording of Materials

Presentations that are made in relation to course work - including lectures - cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

8.8 Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars
https://www.uoguelph.ca/academics/calendars

8.9 Illness

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g.. final exam or major assignment).
_____