

Syllabus

MCG 4340 Mechanical Engineering Laboratory Manual

1 Teaching Staff

Instructors:

Catherine Mavriplis (seminar coordinator): Catherine.Mavriplis@uottawa.ca
Davide Spinello (course coordinator): davide.spinello@uottawa.ca
Stavros Tavoularis: stavros.tavoularis@uottawa.ca
Arnaud Weck: arnaud.weck@uottawa.ca

Teaching and Laboratory Assistants:

Amel Don: adon068@u0ttawa.ca
Dana Duong: DDUON101@uottawa.ca
Deliang Guo: DGU0043@uottawa.ca
She-Ming Lau-Chapdelaine: slauc076@u0ttawa.ca
Brigitte Potvin: bpotv055@u0ttawa.ca
Hassan Shaban: hshab073@u0ttawa.ca

2 Locations

Seminars: Wednesday, 14:30 - 16:00, LEE A131

Tutorials: Friday, 14:30 - 16:00, MRT 212

Laboratories:

Session 1: Monday, 14:30 - 18:30, CBY (see Table 2)

Session 2: Wednesday, 16:00 - 20:00, CBY (see Table 3)

Final Exam: TBD

3 Emergency Information

- The University emergency number is 613-562-5411 (or extension 5411 within the University). Do not call 911 for emergencies within the University.

- Nearest first aid kit locations:

for **B206** in the MCG secretariat on the second floor

for **D06 and E012** in E012 (Mechanical Engineering workshop).

4 Safety Rules

- Know the locations of the nearest exit, fire alarm, and fire extinguisher.
- If it does not belong to you, don't touch it!
- Any accident must be reported immediately to the teaching assistant or to Dr. D. Spinello (course coordinator).

5 Course Outline and Organization

This course consists of seven laboratory experiments covering a number of different areas of mechanical engineering. Because of the interdisciplinary nature of the course, it is being “team taught”, with three different professors responsible for experiments in, or close to, their areas of expertise. Table 1 lists the experiments, their locations and the professors and teaching assistants responsible for each.

Table 1: Information concerning the experiments

Experiment	Room	Instructor	TA
1. Welding and Cutting Processes	CBY E012	A. Weck	H. Shaban
2. Pumps	CBY D06	S. Tavoularis	A. Don
3. Turbine	CBY D06	S. Tavoularis	A. Don
4. Dynamic Balancing of Rotating Masses	CBY B206	D. Spinello	B. Potvin
5. Closed Loop Control System	CBY B206	D. Spinello	B. Potvin
6. Design and Testing of a Structural Sandwich	CBY B206	A. Weck	S. Lau-Chapdelaine
7. Measurement of Frequency and Loudness of Sound	CBY B206	D. Spinello	S. Lau-Chapdelaine

6 Grading Scheme

The mark for this course will be determined by the following contributions with corresponding weights:

Seminars	5%
Laboratory logbook	20%
Final laboratory report	20%
Tutorial assignments	10%
Oral presentation	10%
Final exam	35%

7 Attendance Policy

Each student has to attend all Tutorials, Laboratories and Seminars. If a student cannot attend due to a medical condition, to be certified by an authorized physician, she/he must notify the instructor in advance. Unauthorized absence will result in the failure of the course.

8 Groups

The class is divided into 23 groups according to the list of names published separately. Each student is assigned a group number and must follow this group in all activities of this course. Groups 1 to 12 attend Laboratory Session 1 and Groups 13 to 23 attend Laboratory Session 2.

Table 2: Dates for the laboratories in Session 1 (Monday)

	Welding	Pumps	Turbine	Dynamic Balancing	Controls	Structural Sandwich	Sound
Jan 12	1	2	3	4	5	6	7
Jan 19	2	3	4	5	6	7	8
Jan 26	3	4	5	6	7	8	9
Feb 2	4	5	6	7	8	9	10
Feb 9	5	6	7	8	9	10	11
Feb 16	<i>Study week</i>						
Feb 23	6	7	8	9	10	11	12
Mar 2	7	8	9	10	11	12	1
Mar 9	8	9	10	11	12	1	2
Mar 16	9	10	11	12	1	2	3
Mar 23	10	11	12	1	2	3	4
Mar 30	11	12	1	2	3	4	5
Apr 6	<i>Easter break</i>						
Apr 13	12	1	2	3	4	5	6

Table 3: Dates for the laboratories in Session 2 (Wednesday)

	Welding	Pumps	Turbine	Dynamic Balancing	Controls	Structural Sandwich	Sound
Jan 14	<i>No laboratory</i>						
Jan 21	13	14	15	16	17	18	19
Jan 28	14	15	16	17	18	19	20
Feb 4	15	16	17	18	19	20	21
Feb 11	16	17	18	19	20	21	22
Feb 18	<i>Study week</i>						
Feb 25	17	18	19	20	21	22	23
Mar 4	18	19	20	21	22	23	13
Mar 11	19	20	21	22	23	13	14
Mar 18	20	21	22	23	13	14	15
Mar 24	21	22	23	13	14	15	16
Apr 1	22	23	13	14	15	16	17
Apr 8	23	13	14	15	16	17	18

9 Laboratory schedule

All experiments are located in CBY building; for specific rooms see Table 1. The dates for the laboratories for each group in the two sessions are given in Tables 2 and 3. Numbers in these tables correspond to group numbers.

10 Tutorial Schedule

Tutorials will be given weekly following the schedule in Table 4. Two of these tutorials will include an assignment with the due date indicated in the same table. Note that the marks for these assignments will contribute a total of 10% of the final grade.

11 Oral Presentations

A collective oral presentation will be delivered by each group, but all group members are expected to contribute to it and each should present a roughly equal portion of the material. The topic for each group will be related to a laboratory according to Table 4. Each presentation will last 10 minutes with 3 additional minutes for questions.

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These presentations are not meant to summarize material from the Laboratory Manual or results of the experiments in this course. Instead, they should consist of a self-contained, concise and clear outline of some technological application that is

Table 4: Tutorial schedule and oral presentation group assignments

Date	Topic	Groups presenting
Jan 16	★ Introduction to MCG 4340 ★ How to give an oral presentation (<i>Speaker: William Hallett</i>)	
Jan 23	Roles and Responsibilities in the Workspace (<i>Speaker: Pierre Laflamme</i>)	
Jan 30	Measurement Uncertainty - Rounding of Reported Values (Assignment due on Feb 6)	
Feb 6	Normality Tests - Removal of Outliers (Assignment due on Feb 13)	
Feb 13	Oral presentations: Pumps	2, 3, 14, 15
Feb 20	<i>Study week</i>	
Feb 27	Oral presentations: Turbines	4, 5, 16, 17
Mar 6	Oral presentations: Dynamic Balancing	6, 7, 18, 19
Mar 13	Oral presentations: Controls	8, 9, 20, 21
Mar 20	Oral presentations: Structural Sandwich	10, 11, 22, 23
Mar 27	Oral presentations: Sound	1, 12, 13
Apr 3	<i>Easter break</i>	
Apr 10	TBD	
Apr 14	TBD	

relevant to the subject of the lab. Some synthesis of material collected from various sources is expected and some original analysis in support of the presented material would be desirable. An unprocessed collation of images and videos available in the public domain would be unacceptable.

A typical structure of the presentation is as follows (not all of these items would necessarily be suitable for all presentations).

- Title and presenter names.
- One to two introductory slides explaining the motivation for and the objectives and scope of this presentation.
- Some historical and/or theoretical background.
- Technical aspects specific to the chosen technological application, preferably illustrated by a simple numerical example.
- As much as possible, some suggestion for a novel design or application.
- Summary and conclusions.

Oral presentations will be evaluated according to the following scheme:

Content (10/20)

- Technical level appropriate for audience

- Technical points properly explained
- Pertinence with respect to the assigned topic
- Understanding of the topic
- Logical organization (structure of the presentation)

Appearance (5/20)

- Style of the presentation
- Legibility
- Quality of graphics
- Effectiveness of the message conveyed by the slides

Delivery (5/20)

- Language
- Audibility
- Transition between members of the group
- Balance among all group members
- Timing
- Questions answering

12 Logbook Marking

The logbook should be updated every week and be available for inspection at all activities of this course, including all tutorials and experiments.

Pre-experiment checking: Just before each experiment starts, each laboratory assistant will collect the logbooks of the members of the corresponding group and will briefly inspect their contents concerning the experiment to be conducted. The assistant will initial each logbook, enter the rating “satisfactory” or “unsatisfactory”, and return it to its owner, providing comments orally, if necessary. An unsatisfactory rating will result in 20% reduction of the grade for this particular laboratory.

Correction and grading: At the *beginning* of each tutorial session, each student will hand his/her updated logbook to the corresponding assistant according to the schedule in Table 5. The logbook will contain a full and final entry of all material concerning the corresponding past experiment. Each logbook will be graded by the assistant and returned to the student by the end of the tutorial session. A mark will be assigned to each entry according to the following scheme

70% for content.

30% for appearance and style.

If the pre-experiment rating was unsatisfactory 20% of the maximum mark will be deducted. A penalty will be assigned for a late submission during the tutorial time and a zero mark will be assigned to a logbook that was not submitted during the appropriate tutorial session. The mark will not be adjusted for improvements made

Table 5: Logbook due dates

	Welding	Pumps	Turbine	Dynamic Balancing	Controls	Structural Sandwich	Sound
Jan 16	1	2	3	4	5	6	7
Jan 23	2	3	4	5	6	7	8
Jan 30	3	4	5	6	7	8	9
	13	14	15	16	17	18	19
Feb 6	4	5	6	7	8	9	10
	14	15	16	17	18	19	20
Feb 13	5	6	7	8	9	10	11
	15	16	17	18	19	20	21
Feb 20	<i>Study week</i>						
Feb 27	6	7	8	9	10	11	12
	16	17	18	19	20	21	22
Mar 6	7	8	9	10	11	12	1
	17	18	19	20	21	22	23
Mar 13	8	9	10	11	12	1	2
	18	19	20	21	22	23	13
Mar 20	9	10	11	12	1	2	3
	19	20	21	22	23	13	14
Mar 27	10	11	12	1	2	3	4
	20	21	22	23	13	14	15
Apr 3	<i>Easter break</i>						
Apr 10	11	12	1	2	3	4	5
	21	22	23	13	14	15	16
Apr 14	22	23	13	14	15	16	17
	23	13	14	15	16	17	18
Final exam ¹	12	1	2	3	4	5	6

¹ Students in Laboratory Session 1 attending the Session of April 13 should submit their logbooks to the TA at the beginning of the final exam.

after the initial mark was assigned, but such improvements are recommended for educational purposes. Failure to deliver the logbook to the TA will result to a zero mark for the specific laboratory. As a general rule, students attending Laboratory Session 1 on Monday will have their logbooks marked on Friday in the same week; students attending Laboratory Session 2 on Wednesday will have their logbooks marked on Friday in the following week.

13 Final Reports

Each student will submit an individual final report on the same topic as the one assigned to his/her group for the oral presentation, as specified in Table 4.

Content: The Final Report should be written following the document *Technical Reports* in the Course Manual.

Due date: The due date for all reports is the date of the Final Exam. Submit your report to the teaching assistant before the beginning of the exam.

Correction and grading: Each report will be graded by a teaching assistant. The mark will be assigned according to the following scheme

70% for content.

30% for appearance and style.

14 Final Examination

The final examination will take place during the regular examination period at the end of the term. It will be three-hour long and closed-book. Questions may be asked on any material that was covered in the Course Manual, the Tutorial Sessions and the Professional Practice Seminars. You may be asked to

- Define terms.
- Explain differences and similarities between devices and properties.
- Select suitable methods or devices for a given task.
- Design a measuring system that can perform a prescribed function related to this course's experiments.
- Make some simple calculations similar to those discussed in the tutorials or entered in the logbooks.
- Synthesize information from the entire course with basic engineering concepts and practices.