

Western University
Department of Mechanical & Materials Engineering

MME 2285 B – Engineering Experimentation

COURSE OUTLINE – 2023-2024

CALENDAR DESCRIPTION: Measurement of physical quantities; experiment planning and design; characteristics of measurement systems; calibration, linearity, accuracy, bias and sensitivity; data acquisition systems; sampling theorem; signal conditioning; sources of errors; uncertainty analysis; data analysis techniques; systems for the measurement of displacement; velocity; acceleration; force, strain, pressure, temperature, flow rate, etc.

COURSE INFORMATION: Instructor: Dr. Ryan Willing, PhD, PEng.
Room: TEB 363
Email: rwilling@uwo.ca

Timetable information is available at <https://draftmyschedule.uwo.ca/>

PREREQUISITES: None.

ACCREDITATION UNITS: Science = 25%, Engineering Science = 75%

TOPICS:

- General Characteristics of Measurement Systems
- Measurement Systems with Electrical Signals
- Computerized Data Acquisition Systems
- Discrete Sampling and Analysis of Time-Varying Signals
- Experimental Uncertainty Analysis
- Description of Various Measurement Systems
- Introduction to LabVIEW Software for Data Acquisition and Processing

LEARNING OUTCOMES: Upon successful completion of this course, student will be able to:

- recall and describe the general characteristics of measurements systems used for engineering measurements.
- describe functions and characteristics of common types of measurement systems/instruments used for engineering measurements.
- setup an experiment.
- perform measurements.
- process, analyze and report conclusions based on measured data both orally and in writing.
- estimate the error/uncertainty in measurements.
- work in a team to setup, perform and analyze measured data from an experiment.

UNITS: S.I. will be used, however, British unit may be introduced through examples as required.

CONTACT HOURS:	3 lecture hours, 2 tutorial hours, 1.5 laboratory hours, (5 labs per semester and additional supervised laboratory time for projects), half course.	
RECOMMENDED TEXTBOOKS:	Introduction to Engineering Experimentation, A.J. Wheeler and A.R. Ganji, Third Edition, Prentice Hall, 2010.	
REFERENCES:	None.	
EXAMINATIONS AND QUIZZES:	The examinations will be based on the material covered in lectures, assignments and tutorials. All exams will be closed book. Only non-programmable, single-line-screen calculators will be permitted during the examinations.	
EVALUATION:	Mid Term exam (tentatively Feb. 26, during tutorial timeslot) (1.5 hours, closed book, non-programmable calculator allowed)	15%
	Laboratory work	20%
	LabVIEW quiz (tentatively Mar. 18, during tutorial timeslot)	15%
	Project In-class presentations from Apr. 1 – 5 Deadline for project completion & report submission: Apr. 8	20%
	Final exam (during April final examination period) (2.5 hours, closed book)	30%

*Note: see course-specific policies below which outline circumstances when alternative grading weighting for the midterm and final may apply.

If a minimum mark of 50% is not obtained on the final examination, the student cannot receive a final mark greater than 48%.

COURSE POLICIES:

The following course-specific policies will be enforced throughout the course:

Laboratory sessions

- Labs will be completed in teams of two. Teams of three may be formed by the instructional team where required.
- Failure to pass the laboratory component of the course will result in automatic course failure.
- Passing the laboratory component is equivalent with obtaining more than 50% on the laboratory component of the course.
- A maximum of **one** make-up session will be offered to students who have missed a laboratory session **with** academic consideration.
- Missing of a laboratory session **without** academic consideration will translate into a zero mark for that laboratory session.
- Students arriving to a laboratory session later than 10 minutes after the scheduled start time will be considered absent and will receive a zero mark for that laboratory session.
- Missing two or more laboratory experiments **without** academic consideration may result in a grade of not more than 48% for the entire course.

- Lab reports, if required, are due one week from the date of lab (unless otherwise specified).
- Lab reports must be submitted electronically, and detailed instructions will be provided with the labs' outline.
- Lab reports will not be accepted if the student did not attend the laboratory experiment.

LabVIEW exam

- Missing of the LabVIEW exam **without** academic consideration will translate into a zero mark for that exam.
- If a student misses the LabVIEW exam **with** academic consideration, **one** make-up session will be scheduled for the student to complete an alternative exam (during next available tutorial session, or sooner).
- If cheating during the examination is suspected, the Associate Chair Undergrad will investigate and will determine an appropriate resolution. This may range from completing a one-on-one oral examination with the instructor, to receiving a grade of zero on the exam, to further academic penalties for scholastic offences applied by the Associate Dean Undergrad.

Team deliverables - Projects

- While the default assumption is that everyone contributes equally to the team effort and hence everyone should receive the same mark for the team submission, individual adjustments of the marks are also permitted, at the discretion of the instructional team (*i.e.*, course instructor and teaching assistants).
- The maximum team size will be four students, while the minimum team size will be three students.
- Students who do not choose a team will be assigned to one.

Midterm examination

- The exam will be administered in-person and closed-book.
- Only non-programmable calculators will be allowed during the midterm examination.
- A student who misses the midterm **without** academic consideration will receive a zero mark for the midterm.
- Should a student miss the midterm **with** academic consideration, there will be no make-up midterm, however the value of the midterm will be shifted to the final exam.
- If cheating during the examination is suspected, the Associate Chair Undergrad will investigate and will determine an appropriate resolution. This may range from completing a one-on-one oral examination with the instructor, to receiving a grade of zero on the exam, to further academic penalties for scholastic offences applied by the Associate Dean Undergrad.
- Students are required to contact the instructor of the course for any other circumstances that appear to not be covered by the non-exhaustive list above.

Final examination

- The exam will take place during the Spring examination period. Its timing will be announced in advance.
- The exam will be closed book.

- The length of the final exam will be three hours.
- If a minimum of 50% is not obtained on the final examination, the student cannot receive a final mark greater than 48%.
- If cheating during the examination is suspected, the Associate Chair Undergrad will investigate and will determine an appropriate resolution. This may range from completing a one-on-one oral examination with the instructor, to receiving a grade of zero on the exam, to further academic penalties for scholastic offences applied by the Associate Dean Undergrad.
- Students are required to contact the instructor of the course for any other circumstances that appear to not be covered by the non-exhaustive list above.

Final course grade – alternative weighting scheme

- For eligible students, the contributions of the midterm and final exam to the final course grade will be automatically selected from the two options below, based on whichever is most beneficial for the student's final course grade:
 - Option 1: Midterm and final exam grades contribute to final course grade according to the distributions described in the "Evaluation" section.
 - Option 2: Midterm grade is ignored, and weight is shifted to the final exam.
- To be eligible for Option 2, students must have attempted and received a grade of at least 50% on the midterm, LabVIEW exam, and received a cumulative grade of at least 50% for the labs and project.
- Students with academic accommodations for the midterm automatically be graded according to Option 2, regardless of lab and project grades.

CONSULTATION HOURS:

Office hours: Monday from 3:30 – 4:30 (or by appointment)

ENGLISH:

In accordance with Senate and Faculty Policy, students may be penalized up to 10% of the marks on all assignments, tests and examinations for the improper use of English. Additionally, poorly written work with the exception of final examinations may be returned without grading. If resubmission of the work is permitted, it may be graded with marks deducted for poor English and/or late submission.

ATTENDANCE:

Any student who, in the opinion of the instructor, is absent too frequently from class or laboratory periods in any course, will be reported to the Dean (after due warning has been given). On the recommendation of the Department concerned, and with the permission of the Dean, the student will be debarred from taking the regular examination in the course.

CHEATING:

University policy states that cheating, including plagiarism is a scholastic offense. The commission of a scholastic offence is attended by academic penalties which might include expulsion from the program. If you are caught cheating, there will be no second warning. Scholastic offences are taken seriously and students are directed to the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf

SSD:

Please contact the course instructor if you require material in an alternate format or if any other arrangements can make this course more accessible to you. You may

also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation.

NOTE:

The above topics and outline are subject to adjustments and changes as needed. Students who have failed an Engineering course (ie.<50%) must repeat all components of the course. No special permissions will be granted enabling a student to retain laboratory, assignment or test marks from previous years. Previously completed assignments and laboratories cannot be resubmitted for grading by the student in subsequent years.

STATEMENT ON GENDER-BASED AND SEXUAL VIOLENCE

Western [is committed to reducing incidents of gender-based and sexual violence](#) and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced gender-based or sexual violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts, [here](#). To connect with a case manager or set up an appointment, please contact support@uwo.ca.

INSTRUCTIONS FOR STUDENTS UNABLE TO WRITE TESTS OR EXAMINATIONS OR SUBMIT ASSIGNMENTS AS SCHEDULED

If, on medical or compassionate grounds, you are unable to write term tests or final examinations or complete course work by the due date, you should follow the instructions listed below. You should understand that academic relief will not be granted automatically on request. You must demonstrate to your department (or the Undergraduate Services Office) that there are compelling medical or compassionate grounds that can be documented before academic relief will be considered. Different regulations apply to term tests, final examinations and late assignments. Please read the instructions carefully.

A. GENERAL REGULATIONS & PROCEDURES

1. All first-year students will report to the Undergraduate Services Office by submitting the [Academic Consideration Request Form](#), for all instances.
2. If you are an upper year student and you are missing a test/assignment/lab or examination you will report the absence by submitting [Academic Consideration Request Form](#). Absences worth LESS THAN 10% of your mark, will be processed by your department office. If your course work is worth 10% OR MORE of your final grade, your request will be processed by the Undergraduate Services Office.
3. Check the course outline to see if the instructor has a policy for missed tests, examinations, late assignments or attendance.
4. Documentation must be provided as soon as possible. If no one is available in your

department office or the Undergraduate Services Office, leave a message clearly stating your name & student number and reason for your call. The department telephone numbers are given at the end of these instructions.

5. If you decide to write a test or an examination you should be prepared to accept the mark you earn. Rewriting tests or examinations or having the value of a test or examination reweighted on a retroactive basis is not permitted.

B. TERM/MIDTERM TESTS

1. If you are in first year and you are unable to write a midterm/term test, contact the Undergraduate Services Office, SEB 2097 PRIOR to the scheduled date of the test.
2. If you are an upper year student and you are unable to write a midterm/term test, inform your instructor PRIOR to the scheduled date of the test and request relief through the [Academic Consideration Request Form](#). If the instructor is not available, leave a message for him/her at the department office. If the test is worth LESS THAN 10% of your mark, your request for relief will be processed by your department office. If the test is worth MORE THAN 10% of your final grade your request for relief will be processed by the Undergraduate Services Office.
3. Be prepared to attach supporting documentation to the Department Chair and/or the Undergraduate Services Office through the online form (see next page for information on documentation).
4. Discuss with the instructor if and when the test can be rescheduled. The approval of the Chair or the Undergraduate Services Office is required when rescheduling midterm/term tests.

C. FINAL EXAMINATIONS

1. If you are unable to write a final examination, contact the Undergraduate Services Office PRIOR TO THE SCHEDULED EXAMINATION TIME to report your absence using the [Academic Consideration Request Form](#) and request permission to write a Special Final Examination. If no one is available in the Undergraduate Services Office, leave a message clearly stating your name & student number.
2. Be prepared to provide the Undergraduate Services Office with supporting documentation (see next page for information on documentation) the next day, or as soon as possible (in cases where students are hospitalized). The following circumstances are not considered grounds for missing a final examination or requesting special examinations: common cold, headache, sleeping in, misreading timetable and travel arrangements.
3. In order to receive permission to write a Special Examination, you must obtain the approval of the Chair of the Department **and** the Associate Dean and in order to apply

you must submit an "[Application for a Special Exam](#)" form. The Undergraduate Services Office will then notify the course instructor(s) and reschedule the examination on your behalf.

PLEASE NOTE: It is the student's responsibility to check the date, time and location of the Special Examination.

D. LATE ASSIGNMENTS

1. Advise the instructor if you are having problems completing the assignment on time (**prior** to the due date of the assignment).
2. Be prepared to submit the [Academic Consideration Request Form](#) and provide documentation if requested by the instructor (see reverse side for information on documentation).
3. If you are granted an extension, establish a due date. The approval of the Chair of your Department (or the Assistant Dean, First Year Studies, if you are in first year) is not required if assignments will be completed prior to the last day of classes.
4.
 - i) Extensions beyond the end of classes must have the consent of the instructor, the department Chair and the Associate Dean, Undergraduate Studies. Documentation is mandatory.
 - ii) A Recommendation of Incomplete Form must be filled out indicating the work to be completed and the date by which it is due. This form must be signed by the student, the instructor, the department Chair and the Associate Dean, Undergraduate Studies.

E. SHORT ABSENCES

If you miss a class due to a minor illness or other problem, check your course outlines for information regarding attendance requirements and make sure you are not missing a test, laboratory or assignment. Cover any readings and arrange to borrow notes from a classmate.

F. EXTENDED ABSENCES

If you are absent more than one week or if you get too far behind to catch up, you should consider reducing your workload by dropping one or more courses. (Note drop deadlines listed below). You are strongly encouraged to seek advice from your Academic Counsellor in the Undergraduate Services Office.

G. DOCUMENTATION

If you consulted an off-campus doctor or Student Health Services regarding your illness or personal problem, you **must provide the doctor with a Student Medical Certificate** to complete at the time of your visit and then bring it to the Department (or the Undergraduate Services Office). **This note must contain the following information: severity of illness, effect on academic studies and duration of absence. Regular doctor's notes will not be accepted; only the Student Medical Certificate will be accepted.**

In Case of Serious Illness of a Family Member: Provide a Student Medical Certificate to your family member's physician to complete and bring it to the Department (or the Undergraduate Services Office if you are in first year).

In Case of a Death: Obtain a copy of the death certificate or the notice provided by the funeral director's office. You must include your relationship to the deceased and bring it to the Department (or the Undergraduate Services Office if you are in first year).

For Other Extenuating Circumstances: If you are not sure what documentation to provide, ask the Departmental Office (or the Undergraduate Services Office if you are in first year) for direction.

Note: Forged notes and certificates will be dealt with severely. To submit a forged document is a scholastic offence (see below).

H. ACADEMIC CONCERNS

1. You need to know if your instructors have a policy on late penalties, missed tests, etc. This information may be included on the course outlines. If not, ask your instructor(s).
2. You should also be aware of attendance requirements in some courses. You can be debarred from writing the final examination if your attendance is not satisfactory.
3. If you are in academic difficulty, check out the minimum requirements for progression in the calendar. If in doubt, see your Academic Counsellor.

Calendar References: Check these regulations in your 2023 Western Academic Calendar available at www.westerncalendar.uwo.ca.

Absences Due to Illness:

https://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_135

Academic Accommodations for Students with Disabilities:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_10

Academic Accommodations for Religious or Holy Days:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_16

Course Withdrawals:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=6&SelectedCalendar=Live&ArchiveID=#Page_75

Examinations:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?PolicyCategoryID=5&command=showCategory&SelectedCalendar=Live&ArchiveID=#Page_78

Scheduling of Term Assignments:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=5&SelectedCalendar=Live&ArchiveID=#SubHeading_78

Scholastic Offences:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_20

Student Medical Certificate:

<https://www.eng.uwo.ca/files/undergraduate/student-medical-certificate.pdf>

Engineering Academic Regulations:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=4&SelectedCalendar=Live&ArchiveID=#Page_86

Note: These instructions apply to all students registered in the Faculty of Engineering regardless of whether the courses are offered by the Faculty of Engineering or other faculties in the University.

Add Deadlines:

First term half course (i.e. “A” or “F”)	September 15, 2023
Full courses and full-year half course (i.e. “E”, “Y” or no suffix)	September 15, 2023
Second term half course (i.e. “B” or “G”)	January 16, 2024

Drop Deadlines:

First term half course without penalty (i.e. “A” or “F”)	November 13, 2023
Full courses and full-year half courses without penalty (i.e. “E”, “Y” or no suffix)	November 30, 2023
Second term half or second term full course without penalty (i.e. “B” or “G”)	March 7, 2024

Contact Information:

Undergraduate Services Office: engugrad@uwo.ca	SEB 2097	Phone: 519-661-2130	E-mail:
Chemical & Green Process Engineering: cbeugrad@uwo.ca	TEB 477	Phone: 519-661-2131	E-mail:
Civil Engineering: civil@uwo.ca	SEB 3005	Phone: 519-661-2139	E-mail:
Computer, Electrical, Mechatronic Systems & Software Engineering eceugrad@uwo.ca	TEB 279	Phone: 519-661-3758	E-mail:
Integrated Engineering engceli@uwo.ca	ACEB 2410	Phone: 519-661-6725	E-mail:
Mechanical Engineering: mmeundergraduate@uwo.ca	SEB 3002	Phone: 519-661-4122	E-mail:

October 26th 2023