

MME 2221b - Computational Methods for Mechanical Engineers

COURSE OUTLINE – 2023-2024

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| CALENDAR DESCRIPTION: | The objective of this course is to introduce data organization and processing techniques using spreadsheet tools; and numerical methods, model formulation and programming using advanced mathematical software tools. Applications in applied mathematics and mechanical engineering will be considered throughout the course. |
| COURSE INFORMATION: | Instructor: Abdelkader Baayoun, PhD. Email: abaayoun@uwo.ca |
| PREREQUISITES: | ES 1036A/B, NMM 1411A/B or the former Applied Mathematics 1411A/B, NMM 1414A/B or the former Applied Mathematics 1414A/B |
| COREQUISITES: | NMM 2270A/B or NMM 2276A/B |
| ANTIREQUISITES: | CEE 2219A/B, CBE 2291A/B |
| ACCREDITATION UNITS: | Engineering Science = 40%, Math = 40%, Engineering Design = 20% |
| TOPICS: | <p><u>Spreadsheet topics include:</u></p> <ul style="list-style-type: none">• data sorting & plotting• advanced formulae & conditional formatting• statistical analysis <p><u>Mathematical software topics include:</u></p> <ul style="list-style-type: none">• numerical techniques for differentiation and integration• the assessment of numerical error• the solution of numerical roots problems• linear and nonlinear algebraic equations• curve fitting and the solution of ordinary differential equations |
| LEARNING OUTCOMES: | Upon successful completion of this course, students will develop an advanced working knowledge of Microsoft Excel to organize, perform basic data analysis, and present data, as well as the ability to model and solve a variety of engineering problems using appropriate computational methods in MATLAB. |
| UNITS: | SI units will be used. |
| CONTACT HOURS: | 3 lecture hours, 2 tutorial hours per week, half course. |
| RECOMMENDED TEXTBOOKS: | Chapra, Steven C, 2022, Applied Numerical Methods with Matlab for Engineers and Scientists, 5th Edition |
| REFERENCES: | Nordell, Randy, 2019, Microsoft Excel 365 Complete: In Practice, 2019 Edition |

**EXAMINATIONS
AND QUIZZES:**

Evaluation will consist of eight in-tutorial assignments, two 2-hour quizzes administered in the tutorial sessions, and one 3-hour final exam. In-tutorial assignments are open book and performed in-class in groups. The quizzes are individual and closed book. For the final exam, students will be provided with an information sheet by the instructor if required; no other aid is allowed. A standard scientific calculator is permitted.

EVALUATION:

The final grade is computed as follows (Tentative Schedule):

Weekly In-Tutorial Assignments (8) 20%

- Assignment 1 (2.5%)
- Assignment 2 (2.5%)
- Assignment 3 (2.5%)
- Assignment 4 (2.5%)
- Assignment 5 (2.5%)
- Assignment 6 (2.5%)
- Assignment 7 (2.5%)
- Assignment 8 (2.5%)

Quizzes (2) 40%

- Quiz 1: Week 5 (20%)
- Quiz 2: Week 9 (20%)

Final Examination 40%

The final exam will be scheduled during the final exam period.

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: Tutorial Exercises:

- Tutorial exercises will be carried out in the tutorial rooms where students will collect in their pre-determined groups.
- The tutorial exercises will consist of problems to be solved in a group format.
- Teams will receive problem solving assistance from TA and instructor who will be in the tutorial/zoom room. However, prior knowledge on problems assigned (like the ones solved by the instructor in the preceding week) will be highly beneficial.
- Tutorial exercises will be open book.
- Communication is encouraged during the tutorial exercises, but blatant copying of another team's work will be regarded as a scholastic offence.
- No make-up tutorial exercises will be offered regardless of reason missed.
- Missing a tutorial exercise with academic consideration will shift the weight of the missed exercise equally to the other tutorial exercises.
- Missing a tutorial exercise without academic consideration will result in a mark of zero for that exercise.
- Academic consideration for tutorial exercises (under 5% individual weight) can be obtained from the MME Undergraduate Coordinator by submitting a kuali form.
- Tutorial Exercises are due at the end of the tutorial session in which they are assigned. No late submissions will be accepted.
- The default assumption is that everyone contributes equally to the in-tutorial assignment team effort and hence everyone should receive the same mark for the common team submission.

- 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.

Quizzes:

- Quizzes will be carried out in the tutorial rooms and will consist of problems to be solved individually in a closed book format.
- Communication is not permitted.
- No make-up quizzes will be offered regardless of reason missed.
- Missing a quiz with academic consideration will shift the weight of the missed quiz to the final exam.
- Missing a quiz without academic consideration will result in a mark of zero.
- Quizzes are due at the end of the tutorial session in which they are assigned. No late submissions will be accepted.
- 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.

Team Work:

- If a minimum of 50% is not obtained on term work, the student will fail the course irrespective of the mark obtained in the final examination.

Final Examination:

- The exam will take place during the April examination period.
- The exam will be closed book.
- If a minimum of 50% is not obtained on the final examination, the student cannot receive a final mark greater than 48%.
- If technical issues will prevent a student from successfully completing and submitting the final exam, the official guidelines from Associate Dean's Office, Undergraduate Affairs will be followed. Options to be considered will include but without being limited to oral examination or make-up examination in the special examination period.
- If cheating during the final 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.

Computer Requirements:

- It is highly recommended that all students install Microsoft Excel and MATLAB on their personal computers, and that they bring their laptops to the in-person tutorial sessions. This software is all available at no cost as part of the UWO software site license. If a student does not have a working laptop, one of the tutorial rooms has computers in it, and they can attend that room.

Course Content:

- Lecture notes and online lecture videos are copyrighted to the instructor and hence they are legally protected.
- As such, the unauthorized posting and sharing of the copyrighted course content could be subjected to legal actions.

**CONSULTATION
HOURS:**

Office hours: Zoom (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=>

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:

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| 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:

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| 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:

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| 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: |