

Course Outline: NMM 3415a “Advanced Applied Mathematics for Electrical Engineering”

1. Course Information

Course Information

Numerical and Mathematical Methods 3415a, “Advanced Applied Mathematics for Electrical Engineering”

Fall 2023, Section 001

List of Prerequisites

NMM 2270a/b and NMM 2276a/b

(or the former Applied Mathematics 2270a/b and 2276a/b)

Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees if you are dropped from a course for failing to have the necessary prerequisites.

2. Instructor Information

Instructors	Email	Office	Phone	Office Hours
Prof. Blaine A. Chronik	bchronik@uwo.ca	PAB 241	x86455	By appointment
TA (to be determined)				

Students must use their Western ([@uwo.ca](mailto:uwo.ca)) email addresses when contacting their instructors

3. Course Syllabus, Schedule, Delivery Mode

Western Academic Calendar description:

Topics Include: introduction to complex analysis; complex integration; boundary value problems; separation of variables; Fourier series and transform methods of solution for PDE's, applications to electrical engineering.

Learning Outcomes (preliminary):

Identify a partial differential equation (PDE) boundary-value problem (BVP).

Identify a separable PDE.

Identify specific PDEs: the heat/diffusion equation, the wave equation, and Laplace's equation.

Solve problems involving the 1D heat/diffusion equation.
Solve problems involving the 1D wave equation.
Solve problems involving Laplace's equation in 2D.
Identify and solve non-homogeneous BVPs.
Utilize a Fourier Series to solve BVPs.
Identify and utilize general orthogonal series expansions for solution of BVPs.
Identify and solve BVPs (heat and wave equations) in 2D.
Identify and solve BVPs in non-cartesian coordinates (polar, cylindrical, and spherical coordinates).
Apply Fourier Transform methods for solution of BVPs.
Identify and apply basic arithmetic operations using complex numbers.
Identify and execute simple functions of a complex variable.
Identify and evaluate complex contour integrals.
Identify and apply the Cauchy-Goursat theorem for complex contour integration.
Identify the Residue Theorem and apply for evaluation of complex and real integrals.

Key Sessional Dates:

Classes begin: September 8, 2023

Fall Reading Week: October 29 – November 5, 2023

Classes end: December 8, 2023

Exam period: December 10 – 22, 2023

Contingency plan for in-person class moving to 100% online learning

In the event of a COVID-19 resurgence during the course that necessitates the course delivery moving away from face-to-face interaction, affected course content will be delivered entirely online, either synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL for students to view at their convenience). The grading scheme will **not** change. Any remaining assessments will also be conducted online as determined by the course instructor.

4. Course Materials

Textbook (required): “Advanced Engineering Mathematics, 7th Edition”, D.G. Zill.

This is the same textbook/edition used in NMM 3415a, 2276b, and 2270a last year. The content is very similar to the 6th edition of the same textbook, and students are welcome to use the 6th edition if they have it; however, all responsibilities regarding identifying and navigating any differences between the two editions (particularly in context of problems and/or problem numbers) are that of the student.

All additional course material will be posted to OWL: <http://owl.uwo.ca>.

All students are responsible for checking the course OWL site (<http://owl.uwo.ca>) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class.

If you need assistance with the course OWL site, they can seek support on the OWL Help page. Alternatively, you can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

5. Methods of Evaluation

The overall course grade will be calculated as listed below:

Assignments	10 %
Midterm Test	35 %
Final Exam	55 %

Only the top (i.e., highest grade) 5 assignments will be used to calculate the 10% assignment contribution to the overall course grade. Each assignment will be worth 2% of the total course grade.

Midterm date: [*]

Midterm make-up date: [*]

The midterm will cover all course material introduced up to the date of the midterm.

Final exam date: TBD (set by Registrar, between 10 and 22 December 2023)

Final exam made-up date: January 2023 (exact date TBD)

The final exam will be cumulative, covering all material within the scope of the course.

The Department of Physics and Astronomy may, in exceptional cases, adjust the final course grades in order to conform to Departmental policy.

6. Student Absences

If you are unable to meet a course requirement due to illness or other serious circumstances, please follow the procedures below.

Assessments worth less than 10% of the overall course grade (Assignments):

Of the 6 assignments, only the top 5 will be included in the grade calculation; therefore, you are obviously allowed to miss any single assignment without penalty. An extension of 48 hours (with no penalty) will be allowed for any assignment.

If any additional assignments are missed (regardless of the reason), their weighting (2% per assignment) will be added to the final exam. For example, if all assignments are missed, the final exam will have a 65% weighting for calculation of the final course grade.

No special permission or notification is required in order miss an assignment. If an assignment is missed, the weight will automatically be transferred to the final exam.

Assessments worth 10% or more of the overall course grade (Midterm and Final):

If you miss work totalling 10% or more of the final course grade (i.e., if you miss the midterm or final exam), you must provide valid medical or supporting documentation to the Engineering Academic Counselling Office as soon as possible. For further information, please consult the University's medical illness policy at

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf.

The Student Medical Certificate is available at

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf.

If and only if the Engineering Academic Counselling Office recommends accommodation for the missed assessment, you will be allowed to write the make-up exam for that assessment. If the Counselling office does not recommend accommodation, you will be assigned a grade of 0 for the assessment.

Special notes regarding Absences from the Midterm Examinations

If you cannot write the scheduled midterm make-up exam, you must again provide valid medical or supporting documentation to the Engineering Academic Counselling Office as soon as possible. If and only if the Engineering Academic Counselling Office recommends accommodation, the weight of the midterm will be added to the weight of the final exam (i.e., the final exam will be worth 90% of your course grade).

Special notes regarding Absences from the Final Examinations

You may also be eligible to write the Special Exam (the name given by the University to a makeup Final Exam) if you are in a "Multiple Exam Situation" (e.g., more than 2 exams in 23-hour period, more than 3 exams in a 47-hour period). In this case you must still contact and obtain a recommendation for academic accommodation from the Engineering Academic Counselling Office.

If you cannot write the final make-up exam, you must again provide valid medical or supporting documentation to the Engineering Academic Counselling Office as soon as possible. If and only if the Engineering Academic Counselling Office recommends accommodation, the date of the next Special Examination will normally be the scheduled date for the final exam the next time this course is offered. The maximum course load for that term will be reduced by the credit of the course(s) for which the final examination has been deferred. See the Academic Calendar for details (under [Special Examinations](#)).

7. Accommodation and Accessibility

Religious Accommodation

When a course requirement conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request accommodation for their absence in writing at least two weeks prior to the holiday to the course instructor and/or the Academic Counselling office of their Faculty of Registration. Please consult University's list of recognized religious holidays (updated annually) at

<https://multiculturalcalendar.com/ecal/index.php?s=c-univwo>.

Accommodation Policies

Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf.

8. Academic Policies

The website for Registrarial Services is <http://www.registrar.uwo.ca>.

In accordance with policy,

https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf,

the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at their official university address is attended to in a timely manner.

No electronic devices of any kind (including calculators) will be required or permitted during the midterm or final examinations (including make-up or Special Examinations).

Scholastic offences are taken seriously. Students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

In the event of a health lock-down during which in-person examinations are not possible, tests and examinations in this course may be conducted using a remote proctoring service. By taking this course, you are consenting to the use of this software and acknowledge that you will be required to provide **personal information** (including some biometric data) and the session will be **recorded**. Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. More information about this remote proctoring service, including technical requirements, is available on Western's Remote Proctoring website at:

<https://remoteproctoring.uwo.ca>.

9. Support Services

Please visit the Science & Basic Medical Sciences Academic Counselling webpage for information on adding/dropping courses, academic considerations for absences, appeals, exam conflicts, and many other academic related matters: <https://www.uwo.ca/sci/counselling/>.

Learning-skills counsellors at the Student Development Centre (<https://learning.uwo.ca>) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.