Western Science

Department of Physics and Astronomy

Course Outline
NMM 3415A – Advanced Applied Mathematics for Electrical Engineering
Fall 2025

1. Course Information

NMM 3415A (Fall 2025)

List of Prerequisites:

(Numerical and Mathematical Methods 2270A/B or the former Applied Mathematics 2270A/B) and (Numerical and Mathematics Methods 2276A/B or the former Applied Mathematics 2276A/B).

Unless you have either the requisites for this course or written special permission from your Dean's Designate (Department/Program Counsellors and Science Academic Advisors) 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

Instructor	Email	Office	Phone	Office Hours
Prof. Bogdan Tudose	btudose@uwo.ca		x88777	By appointment

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

3. Course Syllabus, Schedule, Delivery Mode

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.

Antirequisite(s): Applied Mathematics 3413A/B.
Note: Registration is restricted to students in the Faculty of Engineering.

Learning Objectives:

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).
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.

Relevant Key Sessional Dates:

Classes begin:	September 4
Fall Reading Week:	November 3 – 9
Last day of classes:	December 9
Exam period:	December 11 – 22

4. Course Materials

Textbook:

"Advanced Engineering Mathematics, 7th Edition", D.G. Zill.
This is the same textbook/edition used in NMM 3415a, 2276b, and 2270a for the past several years.

OWL:

All course material will be posted to OWL: https://westernu.brightspace.com/

Students are responsible for checking the course OWL site (https://westernu.brightspace.com/) regularly for news and updates. This is the primary method by which information will be disseminated to all students in the class.

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

Technical Requirements

There are no particular technical requirements for this course beyond access to a computer to enable access to the OWL site.

5. Methods of Evaluation

Grading Scheme

The overall course grade will be calculated as listed below:

Quizzes (3)	15%
Midterm Exam	35%
Final Exam	50%

Quizzes/Assignments:

There will be 3 quizzes administered in-person during lecture time, as indicated in the weekly schedule.

Midterm Exam:

Date: Friday October 24, 7pm to 9pm (locations TBA).
Makeup date: Wednesday October 29, 7pm to 9pm (locations TBA).

Final Exam:

Date: TBA (final exam schedule will be posted by the Registrar's Office when available)
The final examination will be cumulative.

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

General information about missed coursework

Students must familiarize themselves with the *University Policy on Academic Consideration – Undergraduate Students in First Entry Programs* posted on the Academic Calendar: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/academic_consideration_Sep24.pdf,

This policy does not apply to requests for Academic Consideration submitted for **attempted or completed work**, whether online or in person.

The policy also does not apply to students experiencing longer-term impacts on their academic responsibilities. These students should consult Accessible Education.

For procedures on how to submit Academic Consideration requests, please see the information posted on the Office of the Registrar's webpage:
https://registrar.uwo.ca/academics/academic_considerations/
All requests for Academic Consideration must be made within 48 hours after the assessment date or submission deadline. All Academic Consideration requests for this course must include supporting documentation; however, recognizing that formal documentation may not be available in some extenuating circumstances, the policy allows students to make one Academic Consideration request **without supporting documentation** in this course. However, the following assessments are excluded from this, and therefore always require formal supporting documentation:

- Examinations scheduled during official examination periods (Defined by policy)
- Practical laboratory and performance tests (Defined by policy)

Midterm (Designated by the instructor as the one assessment that always requires documentation when requesting Academic Consideration).

When a student *mistakenly* submits their one allowed Academic Consideration request **without supporting documentation** for the assessments listed above or those in the **Coursework with Assessment Flexibility** section below, the request cannot be recalled and reapplied. This privilege is forfeited.

Evaluation Scheme for Missed Assessments
Students who miss the midterm without receiving academic consideration will be assigned a grade of zero for the midterm.

Students who miss the midterm and have received academic consideration will be required to write the make-up midterm. If the make-up midterm is missed and the student has received academic consideration, the weight of the midterm exam will be transferred to the final exam. If the make-up midterm is missed and the student does not receive academic consideration, they will be assigned a grade of zero for the midterm.

When a student misses the Final Exam and their Academic Consideration has been granted, they will be allowed to write the Special Examination (the name given by the University to a makeup Final Exam). See the Academic Calendar for details (under Special Examinations), especially for those who miss multiple final exams within one examination period.

6. Additional Statements

Religious Accommodation
When conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request an accommodation for their absence in writing to the course instructor and/or the Academic Advising office of their Faculty of Registration. This notice should be made as early as possible but not later than two weeks prior to the writing or the examination (or one week prior to the writing of the test).

Please visit the Diversity Calendars posted on our university's EDID website for the recognized religious holidays:

https://www.edi.uwo.ca.

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.

Academic Policies
The website for Registrar Services is https://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.

Electronic Devices
Cell phones are not permitted during the midterm and final exams. Simple scientific calculators (with no internet connectivity and no graphing capability) are permitted during exams. In the event that a student's calculator is considered by the instructor to be unsuitable, a replacement calculator will be provided for the exam in question.

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

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

Computer-marked multiple-choice tests and exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

Support Services
Please visit the Science & Basic Medical Sciences Academic Advising 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/.

Students who are in emotional/mental distress should refer to Mental Health@Western (https://uwo.ca/health/) for a complete list of options about how to obtain help.

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 sexual or gender-based violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts at

https://www.uwo.ca/health/student_support/survivor_support/get-help.html.

To connect with a case manager or set up an appointment, please contact support@uwo.ca.

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Accessible Education at

http://academicsupport.uwo.ca/accessible_education/index.html

if you have any questions regarding accommodations.

Learning-skills counsellors at Learning Development and Success (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.

Western University is committed to a thriving campus as we deliver our courses in the mixed model of both virtual and face-to-face formats. We encourage you to check out the Digital Student Experience website to manage your academics and well-being: https://www.uwo.ca/se/digital/.

Additional student-run support services are offered by the USC, https://westernusc.ca/services/.

This course is supported by the Science Student Donation Fund. If you are a student registered in the Faculty of Science or Schulich School of Medicine and Dentistry, you pay the Science Student Donation Fee. This fee contributes to the Science Student Donation Fund, which is administered by the Science Students' Council (SSC). One or more grants from the Fund have allowed for the purchase of equipment integral to teaching this course. You may opt out of the Fee by the end of September of each academic year by completing the online form linked from the Faculty of Science's Academic Advising site. For further information on the process of awarding grants from the Fund or how these grants have benefitted undergraduate education in this course, consult the Chair of the Department or email the Science Students' Council at ssc@uwo.ca.