

## AM4815B/9505B (Winter 2024) Course Outline

### 1. Course Information

AM4815b/9505b --- Partial Differential Equations II (Winter 2024).

Lecture (001): Mon-Wed-Fri, 3:30-4::30pm; in-person in Room UCC-60.

Prerequisites: AM3815 --- Partial Differential Equations I

Unless you have either the requisites for this course or written special permission from your Dean's Designate (Department/Program Counsellors and Science Academic Counselling) 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 in the event that you are dropped from a course for failing to have the necessary prerequisites.

### 2. Instructor Information

Instructors	Email	Office	Phone	Office Hours
Dr Xingfu Zou	xzou@uwo.ca	MC284	88781	Thursdays 2:00-4:00pm

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

### 3. Course Syllabus, Schedule, Delivery Mode

Course topics: This is a cross listed course, a combination of the two courses AM4815 (undergraduate) and AM9505 (graduate). Previously, AM4815 focused on Green's functions under various scenarios of the domain and boundary conditions, and their applications to **linear inhomogeneous** PDEs, while AM9505 intended to offer an introduction **to nonlinear** PDEs for graduate students in applied mathematics. Considering the nature of combination of two totally different courses, my plan is naturally a combination of the syllabuses of the two courses with carefully chosen adoption and abandonment in the two syllabuses. They include:

*Green functions for some common second order linear nonhomogeneous DEs under various boundary scenarios; nonlinear reaction diffusion equations, existence of solutions and their long time dynamics (steady state solutions and their stability, pattern formation, traveling waves); and first order PDEs and the method of characteristics.*

Course outcomes: Students are expected to be able to (i) understand the notion of Green functions in various situation and their roles in expressing and explaining solutions and know how to find Green function for not too complicated DEs; (ii) understand the notion of steady state solution to R-D

equations and their role in determining the long time behaviour of the solutions and know how to analyse a given R-D equation/system in terms of these topics; (iii) know how to employ the method of characteristics to solve some linear and quasi-linear first order PDEs.

Delivery mode: classes and exams will all be in-person.

Classes begin: January 8, 2024

Fall Reading Week: February 17 – 25, 2024

Classes end: April 8, 2024

Exam period: April 11 – 30, 2024

### **Contingency plan:**

Although the intent is for this course to be delivered in person, should any university-declared emergency require some or all of the course to be delivered online, either synchronously or asynchronously, the course will adapt accordingly. The grading scheme will **not** change. Any assessments affected will be conducted online as determined by the course instructor.

## **4. Course Materials**

**Textbook:** Due to the nature of combination of two totally different courses, no single text can be specified, and the materials will be chosen from more than one texts. Below are the two text books on which, much of lectures will be mainly based:

(A) Richard Haberman, Applied Partial Differential Equations, 5th edition, Pearson, 2013.

(B) John David Logan, An Introduction to Nonlinear Partial Differential Equations, John Willy & Sons, 2<sup>nd</sup> Ed, 2008.

Some materials not included in these two books may also be adopted/added in lectures and will be testable in the midterm or final exam. As such, skipping classes may result in disadvantageous consequences.

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.

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

If students need assistance with the course OWL site, they can seek support on the OWL Help page. Alternatively, they 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:

Assignment	15 %.	See explanation below.
Midterm Test	35 %.	<u>Monday February 26, 7:00-9:00pm</u> (room to be announced later)
Final Exam	50 %.	To be determined by the registrar's office

**For assignments**, problems will be assigned on OWL, and completed assignments will be collected and marked partially and selectively only though. There will be five in total, approximately evenly distributed. Graduate students may be required to do some different and/or more problems in some of the assignments. Due times for handing in assignments will be strictly followed. Group study and discussion when working on assignments (and preparing for exams) are encouraged, but copy-each-other in completing assignments is not allowed. Copying from other sources in your assignments is also not permitted. When a copying case is identified, it will be reported to the department chair.

**Midterm and final**, will be in-person and close-book. No notes and electronic devices, including calculators and cell phones, are allowed. The midterm will cover materials of the first six weeks, and the final exams will be accumulative. Problem sets of the midterm and final exams for AM9505 students will be a bit different from those for AM4815 students, reflecting higher expectations for graduate students.

**Note:** This is a course for senior undergraduate students and graduate students, therefore **good presentations** (e.g., neat, logical and rigorous mathematical arguments and computations) of your answers to the problems in assignments, test and exam are encouraged and expected. When marking the assignments, the test and the exam, this factor will be considered.

## 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:**

If you miss the deadline of an assignment due to an unexpected incidence that can be convincingly justified, I may consider either extending the deadline to a reasonable later one, or allocating the weight of that assignment to the rest if it is too late from the deadline.

### **Assessments worth 10% or more of the overall course grade:**

If you miss the midterm, you must provide valid medical or supporting documentation to the Academic Counselling Office of your Faculty of Registration 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/academic\\_consideration.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/academic_consideration.pdf).

The Student Medical Certificate is available at

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/medicalform.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf).

If your Academic Counselling Office approves your request, you can be accommodated either to write a make-up to be held on Saturday March 2, or re-allocate the weight of the midterm to the final exam (cumulative), making the final (which will be cumulative) worth 85%.

### **Absences from Final Examinations:**

If you miss the Final Exam, please contact the Academic Counselling office of your Faculty of Registration as soon as you can do so. They will assess your eligibility to write the Special Examination (the name given by the University to a makeup Final Exam), which is typically in the first week of May.

You may also be eligible to write the Special 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).

If a student fails to write a scheduled Special Examination, the date of the next Special Examination (if granted) normally will 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](#)).

**Note:** missed work can *only* be excused through one of the mechanisms above. Being asked not to attend an in-person course requirement due to potential COVID-19 symptoms is **not** sufficient on its own.

## 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. 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](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](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.

In both midterm and final examinations, no electronic devices are allowed. For assignments, while discussions between students are encouraged, copying other people's assignments is not allowed! If a copying case is identified, penalty will be implemented.

**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:

[http://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/scholastic\\_discipline\\_undergrad.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf).

**In the event of health lock-down**, tests and examinations in this course will 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>.

**Note:** use of online proctoring for in-person courses requires approval from the Dean's Office.

## 8. 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/>.

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](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](mailto: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](http://academicsupport.uwo.ca/accessible_education/index.html)

if you have any questions regarding accommodations.

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