Western University
Course Outline Applied Mathematics 3811a
Fall 2019, Applied Complex Analysis

Instructor: Greg Reid **Office:** MC 281
Email: reid@uwo.ca **Tel:** 679-2111 Ext. 88793
Course Web Site: http://owl.uwo.ca **Instructor Office Hour:** TBA

It is your responsibility to regularly check the course web site for emails, grades, announcements, assignments, important dates etc (at least several times a week). Note however that some announcements will be made only in class. Always include AM3811 in the subject line of emails.

Lectures: M–W–F (9:30 am – 10:30 am) UCC 59

Required Text: *Fundamentals of Complex Analysis: with Applications to Engineering and Science* by Edward Saff and Arthur Snider (3rd Edition, Paperback available in the bookstore, 2017).

Amazon Link to the Text Note that there is also a cheaper e-version available (though not fully e-functonal). See the amazon site above.

Official Description: Functions of a complex variable, analytic functions, integration in the complex plane, Taylor and Laurent series, analytic continuation, Cauchy's theorem, evaluation of integrals using residue theory, applications to Laplace transforms, conformal mapping and its applications.

Prerequisites: Calculus 2303a/b or Calculus 2503a/b. **Antirequisite(s)**: Mathematics 3124a/b.

Contents of course: Material will be taken from the following Chapters of Saff and Snider in the given sequence:

- Complex Numbers (Chapter 1), Analytic Functions (Chapter 2) and Elementary Functions (Chapter 3)
- Intro to Complex Integration (Chapter 4)
- Introduction to Laplace and Fourier Transforms (Chapter 8)
- Series representations for analytic functions (Chapter 5) and Residues (Chapter 6)
- Computing Laplace and Fourier Transforms (Chapter 8)
- Conformal Transformations (Chapter 7, depending on time)

This is a first course in Complex Analysis from an applied perspective. Complex analysis is an essential prerequisite for much of mathematics, engineering and other scientific disciplines. It is also a beautiful subject, where the calculations are elegant, and yields results stunning in their power. Our focus is on giving enough coverage to reach some of the prime applications, especially the application to computing inverse Laplace and Fourier Transforms. Though we move quickly, covering most of the book, the major results of the course are proved.

Attention should be paid to material from lectures, text and web site, to gain a complete view of expectations for course. Our goal is find an understandable path through the material. So some material will be omitted from the text and some material and methods when more efficient, will be given from outside the text. Over-reliance on one source is unwise. For example some material will be covered in the lectures that is not in the text, and in particular in a manner sometimes different to the text.

Course level learning outcomes: Complex analysis is roughly the extension of the familiar real Calculus to complex numbers. Thus students are expected by the end of the course to correctly execute complex calculus computations, such as differentiating, integrating and computing series, etc. Other outcomes include the ability to derive results (proofs) from an applied perspective, with less time spent on this than in a pure mathematics course. By the end of of the course, students should be able to apply complex analysis to problems in Science and interpret the results.

Computers and calculators: No use of calculators on quizzes, midterm or final. Some use of the computer package Maple will be made via myvlab for assigned problems and some quizzes (see `http://myvlab.uwo.ca`).

Prerequisites: Applied Mathematics 2413; **Antirequisites**: Applied Mathematics 3415
Evaluation: Note the corrected date for Quiz 1 below.
20% – About 3 quizzes and about 3 hand in assignments. Quiz 1 is on Wed ~~Nov~~ Sep 18.
15% — Team Presentations
25% – Midterm: Friday October 25, 7 - 10 pm (location TBA)
40% – Final Exam
Team of 3 presentations will involve students choosing lecture material to present 45 min of lecture material during class time (15 min per student) on a topic from the course chosen jointly by the team and I. Lectures will be videod. Teams of 3 are preferred, but teams of 2 are possible. As an alternate, a student may choose a project (min 15 pages). Teams who wish to improve their grade can do an additional lecture on another topic.

Graded assignments and quizzes will all be equally weighted. There will be no make-ups on missed quizzes or assignments, and these receive 0 scores. However, you will be able to drop your lowest score (ie. one quiz score or one assignment score). A makeup is only offered for the final exam and midterm and only with the appropriate documentation and approvals. For consideration of a prorated grade, notification of valid reasons, together with appropriate documentation, for missed quizzes or assignments or midterm should be given at the time of the event. If approval is granted based on the documentation, then the grade will be calculated as:

final grade = 55% final exam + 30% quiz & assignment (in case of dropped midterm) + 15% Presentation
final grade = 55 % final exam + 30% midterm (in case of dropped quiz & assignment) + 15% Presentation

Addendum to all Applied Mathematics Course Outlines: The UWO Senate Academic Handbook has specified that the following points should be added to all course outlines:

1. Plagiarism: Students must write their essays and assignments in their own words. Whenever students take an idea, or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence (see Scholastic Offence Policy in the Western Academic Calendar).

2. Plagiarism Checking: The University of Western Ontario uses software for plagiarism checking. Students may be required to submit their written work and programs in electronic form for plagiarism checking.

3. Prerequisites for a course: Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you will 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.

4. If computer-marked multiple-choice tests and/or exams are given: Use may be made of software to check for unusual coincidences in answer patterns that may indicate cheating.

5. If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or other supporting documentation to your faculty Dean's Office as soon as possible and contact your instructor immediately. It is the student's responsibility to make alternative arrangements with their instructor once the accommodation has been approved and the instructor has been informed. In the event of a missed final exam, a "Recommendation of Special Examination" form must be obtained from your faculty Dean's Office immediately. For further information please see: Link for Medical Appeals Also see the Link to policy on Accommodation Consideration for Student Absences

A student requiring academic accommodation due to illness, should use the Student Medical Certificate when visiting an off-campus medical facility or request a Records Release Form (located in the Dean's Office) for visits to Student Health Services. The form can be found here: Online Form for Medical accomodation .

6. **Statement on Accessiblity**: 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 Services for Students with Disabilities (SSD) at 661-2111 ext. 82147 if you have questions regarding accommodation. Also see the link Registrarial Services.