Applied Mathematics 3811a Complex Variables with Applications.

Course outline for fall 2014.

Lecturer: Dr. Alex Buchel. Email: abuchel [at] uwo.ca.
Web: http://abuchel.apmaths.uwo.ca/∼public/complex2014/complex2014.php
Material: Fundamentals of Complex Analysis for Mathematics, Science and Engineering, E.B. Saff and A.D. Snider. Prentice-Hall

Lectures (UCC-53): Mon, Wed, Fri 9:30-10:30.

Antirequisite(s): Mathematics 3124A/B (Complex Analysis I).
Prerequisite(s): Calculus 2303A/B (Intermediate Calculus II) or 2503A/B (Advanced Calculus II) or the former Applied Mathematics 291b.

Assessment

Three quizzes: 3 x 5%. Total: 15%
Midterm: 30% or 40%
Final : 55% or 45%

(which ever scheme is to your advantage)

Exams & quizzes

- Quizzes: Friday Oct. 17, Friday Nov. 14, Friday Nov. 28
- Midterm: Wednesday Oct. 29, 7-10pm, venue TBA
- Final: TBA

If there is a scheduling conflict with a religious holiday, you must inform me at the beginning of the course since such events are known years beforehand.

Quizzes:

No tricks, just study (and do it well!) the assignments, textbook & lecture notes and you will do very well. Please keep in mind: anything that is in the assignments, textbooks or lectures (including possible additional notes) may be asked, even the long questions (you should have solved them hence you should be able to solve those problems quickly in an exam).

There will typically (but not necessarily) be one wordy question.

Solution to Quizzes will be posted on course website (see above)

Make-up exam(s)

Only with instructor's permit & has to be arranged at least one week before the scheduled exam. For students with extraordinary personal or family circumstances, it is the student's responsibility to contact the instructor WITHIN ONE WEEK of the missed exam (see the section at the end of this document for detailed instructions). Documentation will be required to prove the reason for absence (your faculty has an illness/compassionate absence form that you should use in such a case + medical doctors also provide a proof if requested).

Assignments

I will post weekly assignments. You do not have to return them and whether or not you solve them is up to you. I do, however, strongly recommend solving them in a timely manner after each topic since at least 90% of the quizz questions will be entirely based on the assignments (incl. examples from classes) and at least 70% of the midterm & final exam questions will be heavily based on them (incl. examples from classes) . I will not post solutions to the problems and I will not solve them for you (in case you thought that arranging an appointment and having problem/problems solved would be an option).

The **only** way of learning the topics covered in this course is by solving problems, a lot of them.

I encourage you to work together and solve problems with your fellow students. That enhances the learning experience as no two persons have the exact same approach to problem solving.

Course outline. At least the following will be covered:

1. Ch1.: Ch1.1–1.6
    - The algebra of complex numbers
    - Point representation of complex numbers
    - Vectors and polar forms
    - The complex exponential
    - Powers and roots
    - Planar sets
2. Ch2.: Ch2.1–2.5
    - Functions of complex variables
    - Limits and continuity
    - Analyticity
    - The Cauchy-Riemann equations
    - Harmonic functions
3. Ch3.: Ch3.1–3.5
    - Polynomials and rational functions
    - The exponential, trigonometric, and hyperbolic functions
    - The logarithmic functions
    - Washers, wedges and walls
    - Complex powers and inverse trigonometric functions
4. Ch4.: Ch4.1–4.6
    - Contours & Contour integrals
    - Independence of paths
    - Cauchy's integral theorem
    - Cauchy's integral formula and its consequences
    - Bounds for analytic functions
5. Ch5.: Ch5.1–5.3, 5.5–5.8
    - Sequences and series
    - Taylor series
    - Power series
    - Laurent series
    - Zeros and singularities
    - The point at infinity
    - Analytic continuations
6. Ch6.: Ch6.1–6.6
    - The residue theorem
    - Trigonometric integrals over $[0, 2\pi]$
    - Improper integrals of certain functions over $(-\infty, \infty)$
    - Improper integrals involving trigonometric functions
    - Indented contours
    - Integrals involving multiple-valued functions
7. Ch7.: Ch7.1–7.2
    - Invariance of Laplace's equation
    - Geometric considerations

Lecture notes

You are responsible for taking notes. If you miss a class, please ask your classmates first. No transcripts will be provided.

Office hours and such

1. I will use course webpage/WebCT for announcements. Please check it regularly. I will not send emails for announcements.
2. Office hours: Mon, 10:30-12:00
3. Teaching assistant: TBA

What to do in case of illnesses or other serious circumstances

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's 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's Dean's Office immediately. For further information please see: http://uwo.ca/sci/undergrad/academic_counselling/resources_and_self_service/faq.html#

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: https://studentservices.uwo.ca/secure/medical_document.pdf

University policies

1. Medical: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf
2. Religious: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf
3. Disabilities: http://accessibility.uwo.ca/students/academic_info.html
4. Compassionate: Contact your faculty if you need a form
5. Scholastic discipline:
   http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf
6. Need more? Please see the University Handbook