



UNSW SCIENCE
School of Maths and Statistics

Course outline

MATH2069
Mathematics 2A

Term 3, 2022

integrals and curl and divergence. [Applications include mechanics and dynamics, electrostatics, graphics and design.]

Complex Analysis extends calculus from real numbers to complex numbers, and develops the theory of analytic functions, complex integration and Cauchy's theorem, series expansions, the residue theorem and applications to real improper integrals and trigonometric integrals. [Applications include fluid flow, electrostatics, circuit theory, and heat flow.]

Course Description

Several Variable Calculus: Vectors, differential calculus of curves in R^3 and surfaces, Taylor series for functions of two variables, critical points, local maxima and minima. Lagrange multipliers, integral calculus for functions of several variables using various co-ordinate systems, conservative vector fields and line integrals, Green's Theorem in the plane, divergence and curl, surface integrals, Stokes' Theorem, Gauss' divergence Theorem. Complex Analysis: Complex numbers, simple mapping problems, differentiation theory for complex functions, Cauchy Riemann equations, analytic functions, the elementary functions, Integration Theory for complex functions, Cauchy's Theorem and the Cauchy integral formulae, Taylor series and Laurent Series, residues, evaluating real integrals and trigonometric integrals using residues. Note: Available only to students for whom it is specifically required as part of their program

Assessment and Deadlines

Assessment	Week	Weighting %	Notes
Weekly Quiz	Week 1-5	10	At the beginning of each week, an online quiz containing 4 questions (2 questions each for Vector Calculus and Complex Analysis) will be released. Students will have until the end of the following week to submit their answers and they can try their answers as many times as they want. The task will be worth 10% towards the final mark for Complex Analysis and Vector Calculus
Written Tests (These will be given online during the lecture hours)	Week 8	15	Complex Test
		15	Vector Test
Final Exam	Exam period	60	

Late Submission of Assessment Tasks

No late submissions will be accepted. (Where "late" in this context means after any extensions granted for Special Consideration or Equitable Learning Provisions.)

Course Learning Outcomes (CLO)

CLO1 Understand the differentiation theory for functions of several variables.

CLO2 Perform basic calculations relating to tangent planes, normal lines, directional derivatives, curves and surfaces in three dimensional space, lagrange multipliers, location and classification of critical points

CLO3 Understand the basic theory of line and surface integrals and the theorems of Green, Stokes and Gauss.

CLO4 Perform basic calculations relating to line and surface integrals and apply the theorems of Green, Stokes and Gauss.

CLO5 Understand the basic integration theory for functions of several variables.

CLO6 Perform basic calculations relating to double and triple integrals in cartesian, polar and spherical coordinates.

CLO7 Understand the main properties of vector fields in Cartesian, polar and spherical coordinates.

5	CA: Arcs, contour integrals and antiderivatives. Cauchy- Goursat theorem. Homotopy version of Cauchy-Goursat theorem. VC: Double integrals continued (including polar coordinates); Triple Integrals.
7	CA: The Cauchy integral formula. The generalised Cauchy integral formula. Taylor Series. VC: Triple integrals continued (including cylindrical and spherical coordinates)
8	CA: Laurent series. Zeroes and singularities. VC: Change of variables; Line integrals; Green's Theorem.
9	CA: The method of Residues. The Z-Transform. (The Z-transform will not be examinable this year.) VC: Surface integrals; Flux Integrals
10	CA: Real Improper integrals. Trigonometric integrals. Revision. VC: Divergence and curl; Stokes Theorem; Divergence Theorem

Textbooks

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW staff and students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

Some of these areas will be familiar to you, others will be new. Gaining a solid understanding of all the related aspects of ELISE will help you make the most of your studies at UNSW.

The *ELISE* training webpages:

<https://subjectguides.library.unsw.edu.au/elise/aboutelise>

Equitable Learning Services (ELS)

If you suffer from a chronic or ongoing illness that has, or is likely to, put you at a serious disadvantage, then you should contact the Equitable Learning Services (previously known as SEADU) who provide confidential support and advice.

They assist students:

- living with disabilities
- with long- or short-term health concerns and/or mental health issues
- who are primary carers
- from low SES backgrounds
- of diverse genders, sexes and sexualities
- from refugee and refugee-like backgrounds
- from rural and remote backgrounds
- who are the first in their family to undertake a bachelor-level degree.

Their web site is: <https://student.unsw.edu.au/els/services>

Equitable Learning Services (ELS) may determine that your condition requires special arrangements for assessment tasks. Once the School has been notified of these, we will make every effort to meet the arrangements specified by ELS.

Additionally, if you have suffered significant misadventure that affects your ability to complete the course, please contact your Lecturer-in-charge in the first instance.

Academic Skills Support and the Learning Centre

The Learning Centre offers academic support programs to all students at UNSW Australia. We assist students to develop approaches to learning that will enable them to succeed in their academic study. For further information on these programs please go to:

<http://www.lc.unsw.edu.au/services-programs>

Applications for Special Consideration for Missed Assessment

Please adhere to the Special Consideration Policy and Procedures provided on the web page below when applying for special consideration.

<https://student.unsw.edu.au/special-consideration>

Please note that the application is not considered by the Course Authority, it is considered by a centralised team of staff at the Nucleus Student Hub.

The School will contact you (via student email account) after special consideration has been granted to reschedule your missed assessment, for a *lab test or paper-based test* only.

For applications for special consideration for *assignment extensions*, please note that the new submission date and/or outcome will be communicated through the special consideration web site only, no communication will be received from the School.

For Dates on Final Term Exams and Supplementary Exams please check the “Key Dates for Exams” ahead of time to avoid booking holidays or work obligations.

<https://student.unsw.edu.au/exam-dates>

If you believe your application for Special Consideration has not been processed, you should email specialconsideration@unsw.edu.au immediately for advice.

Course Evaluation and Development (MyExperience)

Student feedback is very important to continual course improvement. This is demonstrated within the School of Mathematics and Statistics by the implementation of the UNSW online student survey *myExperience*, which allows students to evaluate their learning experiences in an anonymous way. *myExperience* survey reports are produced for each survey. They are released to staff after all student assessment results are finalised and released to students. Course convenor will use the feedback to make ongoing improvements to the course.