ADV CALCULUS 2 FOR ELECTRICAL ENGINEERS 1239 FALL 2023

ECE 206

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CLASS SCHEDULE

Section	Location	Time	Instructor(s)
ECE 206 001 *[LEC]*	EIT 3151	Mondays & Fridays 1 p.m. - 2:20 p.m.	Mani Thamizhazhagan athamizhazhagan@uwaterloo.ca
	E7 4043	Thursday, September 7th 12:30 p.m. - 1:20 p.m.	
		Thursday, September 21st 12:30 p.m. - 1:20 p.m.	
		Thursday, October 5th 12:30 p.m. - 1:20 p.m.	
		Thursday, October 26th 12:30 p.m. - 1:20 p.m.	
		Thursday, November 9th 12:30 p.m. - 1:20 p.m.	
		Thursday, November 23rd 12:30 p.m. - 1:20 p.m.	
ECE 206 101 *[TUT]*	EIT 3151	Thursdays 5:30 p.m. - 6:20 p.m.	
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INSTRUCTOR / TA INFORMATION

Instructor: Aasaimani Thamizhazhagan (he/him) athamizh@uwaterloo.ca (mailto:athamizh@uwaterloo.ca)

LEARN: *learn.uwaterloo.ca* is the place to find all important communication from instructor to students as well as other course materials. You should regularly check the **Announcements** for information about changing due dates, instructor absence, etc.

Mobius is where the course content will appear. You can link to the Mobius ECE 206 page directly from the main

page in LEARN. In addition, the weekly online assignments will be completed through Mobius. Separate links are available in LEARN under **Content > Mobius Assignment Links**.

Office hours: Tuesdays 3-4 in MC 6459 (Any changes will be posted in LEARN). I am also available by appointment.

COURSE DESCRIPTION

> *Calendar Description for ECE 206*
>
> Triple integrals, cylindrical and spherical polar coordinates. Divergence and curl, applications. Surface integrals, Green's, Gauss' and Stokes' theorems, applications. Complex functions, analytic functions, contour integrals, Cauchy's integral formula, Laurent series, residues. [Offered: F,S]
>
> Prereq: 2B Electrical Engineering or Computer Engineering

LEARNING OUTCOMES

By the end of this course students should be able to:

Describe curves and surfaces using a parametric representation, and apply this to line and surface integrals (1a)
Understand the interpretation of and be able to evaluate line and surface integrals of both scalar and vector fields (1a, 2a)
Understand the concepts of divergence and curl and use these to apply the major theorems of vector calculus to problems in e.g. electromagnetics (1a, 2a, 2b)
Apply methods from complex analysis to solve electrostatic potential problems using conformal mappings (1a, 2a, 2b)
Understand how complex analysis can be applied to integral transforms and problems in control (2b)

(Numbers in parentheses refer to CEAB Graduate Attributes)

1. Knowledge Base

a. Demonstrate understanding of concepts in mathematics

2. Problem Analysis

a. Formulate a problem statement

b. Develop models to solve engineering problems including identifying approximations, assumptions and constraints

TENTATIVE COURSE SCHEDULE

VECTOR CALCULUS (WEEKS 1-6)

- review - basics from linear algebra
- parametric description of curves and surfaces; arc length, surface area, normal vector
- double and triple integrals; polar, cylindrical, spherical coordinates
- vector fields; line integrals of scalar and vector fields;
- fundamental theorem for line integrals; Green's theorem
- surface integrals of scalar and vector fields; flux
- divergence and curl
- Divergence Theorem, Stokes' Theorem
- applications - Maxwell's equations

COMPLEX ANALYSIS (WEEKS 7-12)

- review of complex numbers (Cartesian/polar forms, nth roots)
- complex functions; mappings
- complex differentiation (analytic functions, Cauchy-Riemann equations)
- application to potential theory - Conformal Mappings
- contour integration (path integrals, Cauchy-Goursat Theorem, Cauchy's Integral formulas)
- power series and residues (Taylor/Laurent series, singularities, the Residue Theorem)
- applications of the residue theorem - integral transforms

A NOTE ABOUT CONTINGENCY PLANS

It is possible that we will run into some unexpected situations.

Student Absence: If you need to miss some aspect of the course due to illness, self-isolation, or some other situation beyond your control, contact your instructor (and possibly your ECE advisor) as early as possible to let them know (and if applicable provide them with documentation). Documentation is not required for COVID-19-related absence, nor for two (2) day short-term absence. Typically any weights for missed assessments will be shifted to the final exam, and a missed final exam will be written during the Registrar Office makeup exam dates (announced later in the term). In addition, see below under **Student Assessment**.

Online Learning: If circumstances dictate a shift to online learning, course content will be posted in Mobius and on LEARN and **synchronous meetings will be held on MS Teams during the scheduled lecture times**. Attendance is expected, but recordings and transcripts will be available afterwards for those who cannot attend (or wish to watch again).

TEXTS / MATERIALS

Title / Name	Notes / Comments	Required
Advanced Engineering Mathematics by Michael Greenberg	2nd edition	No

PROBLEM SETS

Roughly each week there will be a problem set posted for you to work on. These are not to be handed in, but will contain similar problems as the assessments. These are meant to give you a deeper understanding of the content you are studying. Solutions will be posted, but **you are strongly encouraged to attempt all of the problems before the solutions are released**.

PIAZZA

Piazza is a discussion board which can be accessed through LEARN, where you can ask any questions about content in the course. You can post your question publicly so classmates can see, and can post anonymously if you choose (Note: you will be anonymous to classmates but not the instructor). The instructional team will do our best to answer questions in a timely manner. While it is encouraged for students to discuss course material, you should not post partial or complete answers to the assignments publicly.

Note that Piazza supports LaTex syntax for Math. There's also a built-in formula editor that ultimately pastes the LaTex code. There is a good LaTex primer at http://tug.ctan.org/info/undergradmath/undergradmath.pdf (http://tug.ctan.org/info/undergradmath/undergradmath.pdf)

STUDENT ASSESSMENT

Component	Value
Mobius Assignments (best 8 of 9)	15%
Quizzes (best 3 of 4)	20%
Midterm	25%
Final Exam	40%

Mobius Assignments: Most weeks, there will be an assignment to be completed in Mobius. These are completely online and are automatically graded, and will consist mostly of multi-select multiple choice questions. You have up to five attempts for each assignment and only your best attempt counts. **You will see your grade after each attempt but not the solutions until after the window is closed.** These will typically be open on Friday of one week with a deadline of the following Friday at 11:59 p.m. There is no time limit on each attempt. Your lowest grade

will be dropped.

IT IS VERY IMPORTANT THAT YOU ACCESS MOBIUS ASSIGNMENT THROUGH THE LINK IN LEARN! Under LEARN, see **Content > Mobius Assignment Links > Mobius Information** for more information.

Quizzes: There will be **four** quizzes which will be held on the following dates: **September 28, October 19, November 16, November 30**. These are held during the scheduled tutorial times **Thursdays 5:30-6:20 p.m.** Your best three of four will count toward your final grade.

For any student who misses a quiz due to illness or other circumstances with appropriate documentation, the best two of three will count. If a student misses two or more quizzes, some of the quiz weight will be transferred onto the final exam.

Midterm: The midterm will take place **Friday October 27, 1:00-2:30 p.m.**

Final Exam: The final exam will take place during the scheduled examination period December 8-21. Details to be announced later.

Note: If any quiz, the midterm or final exam cannot be held in person, it will instead be a Crowdmark remote assessment in a fixed time slot, likely with some additional time for the necessities and unpredictabilities of remote assessments.

FAIR CONTINGENCIES FOR EMERGENCY REMOTE TEACHING

We are (perhaps?) still facing unusual and challenging times. The course outline presents the instructor's intentions for course assessments, their weights, and due dates in Fall 2023. **As best as possible, we will keep to the specified assessments, weights, and dates.** To provide contingency for unforeseen circumstances, the instructor reserves the right to modify course topics and/or assessments and/or weight and/or deadlines with **due and fair notice to students**. In the event of such challenges, **the instructor will work with the Department/Faculty to find reasonable and fair solutions that respect rights and workloads of students, staff, and faculty.**

ASSIGNMENT SCREENING

No assignment screening will be used in this course.

ADMINISTRATIVE POLICY

Course Conduct: I am committed to creating a learning environment where diverse perspectives are recognized and valued as a source of strength. I request that all students work with me to create a class culture based on open communication, mutual respect, and inclusion. As a class we will approach all discussions with respect and civility. Disagreements and debates in academic discourse are expected and welcome, but personal attacks are never OK, and will not be tolerated. I strive to ensure an open and welcoming classroom for all students. If I ever miss the mark, please don't hesitate to contact me. We are all learning together.

Caregiver Responsibilities Policy: I have great respect for students who are balancing their pursuit of education with the responsibilities of caring for children or other family members. If you run into challenges or if your caregiving responsibilities are interfering with your ability to engage in this course, please contact me.

School-Life Conflict: Many students face obstacles to their education as a result of work or family obligations or unforeseen personal difficulties. If you are experiencing challenges throughout the term that are impacting your ability to succeed in this course, or in your undergraduate career more broadly, please reach out to me so that we can work together to form a plan for your academic success.

Avoiding Academic Offences: The Möbius Assignments are individual exercises. They must not be completed in pairs or groups.

MENTAL HEALTH

Please don't hesitate to make use of the services below if you are feeling overwhelmed or have the slightest inclination that you are in need of some support.

On-campus Resources:

Campus Wellness https://uwaterloo.ca/campus-wellness/ (https://uwaterloo.ca/campus-wellness/)

Counselling Services: counselling.services@uwaterloo.ca/ 519-888-4567 ext 32655

MATES: one-to-one peer support program offered by Waterloo Undergraduate Student Association (WUSA) and Counselling Services: mates@uwaterloo.ca

Health Services: located across the creek from the Student Life Centre, 519-888-4096.

Off-campus Resources:

Good2Talk (24/7): Free confidential help line for post-secondary students. Phone: 1-866-925-5454

Here 24/7: Mental Health and Crisis Service Team. Phone: 1-844-437-3247

OK2BME: set of support services for lesbian, gay, bisexual, transgender or questioning teens in Waterloo. Phone: 519-884-0000 extension 213

TERRITORIAL ACKNOWLEDGEMENT

The University of Waterloo acknowledges that much of our work takes place on the traditional territory of the Neutral, Anishinaabeg and Haudenosaunee peoples. Our main campus is situated on the Haldimand Tract, the land granted to the Six Nations that includes six miles on each side of the Grand River. Our active work toward reconciliation takes place across our campuses through research, learning, teaching, and community building, and is co-ordinated within the Office of Indigenous Relations.

The course instructor would like to stress that this territorial acknowledgement is one step on the path of

reconciliation, and all students are encouraged to learn about Indigenous initiatives (https://uwaterloo.ca/human-rights-equity-inclusion/indigenousinitiatives) at the University of Waterloo. There you will find information and events that are available to all members of the University of Waterloo community. If you would like to learn more about Indigenous territories, treaties, and languages where you live or elsewhere in the world, visit https://native-land.ca/ (https://native-land.ca/) .

UNIVERSITY POLICY

Academic integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. [Check the Office of Academic Integrity (https://uwaterloo.ca/academic-integrity/) for more information.]

Grievance: A student who believes that a decision affecting some aspect of their university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4 (https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70) . When in doubt, please be certain to contact the department's administrative assistant who will provide further assistance.

Discipline: A student is expected to know what constitutes academic integrity to avoid committing an academic offence, and to take responsibility for their actions. [Check the Office of Academic Integrity (https://uwaterloo.ca/academic-integrity/) for more information.] A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course instructor, academic advisor, or the undergraduate associate dean. For information on categories of offences and types of penalties, students should refer to Policy 71, Student Discipline (https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71) . For typical penalties, check Guidelines for the Assessment of Penalties (https://uwaterloo.ca/secretariat/guidelines/guidelines-assessment-penalties) .

Appeals: A decision made or penalty imposed under Policy 70, Student Petitions and Grievances (https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70) (other than a petition) or Policy 71, Student Discipline (https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71) may be appealed if there is a ground. A student who believes they have a ground for an appeal should refer to Policy 72, Student Appeals (https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-72) .

Note for students with disabilities: AccessAbility Services (https://uwaterloo.ca/accessability-services/) , located in Needles Hall, Room 1401, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with AccessAbility Services at the beginning of each academic term.

Turnitin.com: Text matching software (Turnitin®) may be used to screen assignments in this course. Turnitin® is used to verify that all materials and sources in assignments are documented. Students' submissions are stored on a U.S. server, therefore students must be given an alternative (e.g., scaffolded assignment or annotated bibliography), if they are concerned about their privacy and/or security. Students will be given due notice, in the first week of the term and/or at the time assignment details are provided, about arrangements and alternatives for the use of Turnitin in this course.

It is the responsibility of the student to notify the instructor if they, in the first week of term or at the time assignment details are provided, wish to submit alternate assignment.