

PHYS:4761

Mathematical Methods of Physics I

Fall 2020

Instructor:	Professor Gregory Howes
Office:	412 Van Allen Hall
Phone:	(319)335-1221
E-mail:	gregory-howes@uiowa.edu
Office Hours:	1:30–2:30pm W, 11:30am–1:30pm Th, or by appointment
Department:	Physics & Astronomy, 203 Van Allen Hall, Prof. Phil Kaaret, Chair
Catalog Description:	Functions of complex variables, integration methods, linear vector spaces, tensors, matrix algebra.
Course Modality:	<i>Synchronous Online Course</i> Lectures will be held on Zoom on the scheduled dates and times Zoom Link: https://uiowa.zoom.us/j/97664716060?pwd=UmZtdHZpQ2hyVWhuUStuazBWR1R6Zz09 Meeting ID: 976 6471 6060 Passcode: 4761
Lectures:	Monday, Wednesday, and Friday, 11:30–12:20pm Synchronous Zoom Teleconferences.
Required Textbook:	Arfken, Weber, & Harris, <i>Mathematical Methods for Physicists</i> , 7th edition
Recommended Reference:	Spiegel, Lipschutz, & Liu, <i>Schaum's Outlines: Mathematical Handbook of Formulas and Tables</i> , 4th edition
Web Page:	http://homepage.physics.uiowa.edu/~ghowes/teach/phys4761/index.html
Exams	Two Midterm Exams: Due on Friday, Oct 9 and Friday, Nov 20, 5:00pm Final Exam: Due on Wednesday, Dec 16, 5:00pm
Grading:	Homework: 20% Two Midterm Exams: 20% each Final Exam: 40%
Topics:	Chapters 1–10 and 23 of Arfken, Weber, & Harris in PHYS:4761. See schedule below
Lecture Notes:	Lecture notes will be available <i>before</i> the synchronous Zoom lectures on my personal course website (not ICON) under “Lectures” at http://homepage.physics.uiowa.edu/~ghowes/teach/phys4761/index.html You are encouraged to download and print out the notes for each lecture before the Zoom meeting so that you can follow along the lecture most easily and take notes as desired. Note that these lectures notes were written for a course delivered through two 75 minute lectures per week, rather than three 50 minute lectures per week, so we will be splitting two sets of Lecture Notes over three Zoom meetings each week. The calendar below indicates when each set of Lecture Notes will be covered.

- Grader:** The grader for this course is Ohannes Kamer Koseyan, kamer-koseyan@uiowa.edu.
- Homework:** Homework will be assigned weekly, due on Friday at 5:00pm. Late homework will not be accepted. **To turn in your homework, please scan your completed homework solutions into a *single* PDF file and email it to the grader Ohannes Kamer Koseyan, kamer-koseyan@uiowa.edu, before the 5:00pm Friday deadline.** Working through the homework problems is a critical step in learning the course material. You are encouraged to work together in groups on the homework, but each student must write his or her own solutions; you may discuss how to solve the problem together, but you may not copy another student's solution.
- Symbolic Solvers:** The only way to learn to use advanced mathematical methods is to actually apply them yourself. Thus, you are not allowed to use symbolic solvers (Mathematica, Maple, etc.) to do your homework. You may check your answers with this software, if you wish, but the homework that you submit must have the solutions written out by hand to demonstrate that you actually solved problem yourself, otherwise you will get at most half credit for that problem.
- Solutions:** Solutions for the homework assignments and midterm exams will be available only to enrolled students through the ICON course website under the "Files" section.
- Zoom Office Hours:** During the scheduled office hours, I will start a Zoom teleconference and be available. If other students are meeting with me, you may be asked to wait in the Zoom Waiting Room until I am free. To avoid confusion, the Zoom link for office hours is the same as the Zoom link for lectures:
Zoom Link:
<https://uiowa.zoom.us/j/97664716060?pwd=UmZtdHZpQ2hyVWhuUStuazBWR1R6Zz09>
Meeting ID: 976 6471 6060
Passcode: 4761

- Midterm Exams:** The midterm exams will be given as take-home exams. The exams are all closed book and closed notes, but you may use a Formula Summary Sheet (see below). The midterm exams will be distributed by email to each student immediately after the Wednesday Zoom lecture on the week of the exam, and will be due on Friday at 5:00pm. You should print out the exam so that you can write your solutions directly on the exam. You are allowed to use as much scratch paper (or additional sheets for writing the solutions) as you need, and you may use a calculator. You will have only 75 minutes to complete each exam, but you may take a 10 minute break (not counted as part of the 75 minutes) halfway through. During the break, you may not communicate with other students about the exam or consult the text, homework solutions, or lecture notes. To turn in your exam, please scan your completed exam (including any additional sheets you may have needed to write up the solutions) into a *single* PDF file and email it to gregory-howes@uiowa.edu before the 5:00pm Friday deadline.
- Final Exam:** The final exam will be given as take-home exam. The exam is closed book and closed notes, but you may use a Formula Summary Sheet (see below). The final exams will be distributed by email to each student immediately after the final Zoom lecture meeting on Friday, December 11, 2020, and will be due at 5:00pm on Wednesday, December 16, 2020. You should print out the exam so that you can write your solutions directly on the exam. You are allowed as much scratch paper (or additional sheets for writing the solutions) as you need, and you may use a calculator. You will have only 120 minutes to complete the exam, but you may take a 10 minute break (not counted as part of the 120 minutes) halfway through. During the break, you may not communicate with other students about the exam or consult the text, homework solutions, or lecture notes. To turn in your exam, please scan your completed exam (including any additional sheets you may have needed to write up the solutions) into a *single* PDF file and email it to gregory-howes@uiowa.edu before the 5:00pm Wednesday deadline.
- Formula Summary Sheets:** All exams are closed book and closed notes. For each exam, you are allowed to prepare a Formula Summary Sheet to use during the exam. For each midterm exam, your Formula Summary Sheet may use two sides of 8.5 inch by 11 inch paper. You may also reference the Formula Summary Sheets from previous exams (which do not count against the two side limit). For the final, in addition to the four sides of Formula Summary Sheets from the two midterm exams, you may include one additional side of 8.5 inch by 11 inch paper (for a total of 5 sides of paper).
- Honor Code:** Course grading is only fair to all students if all students abide by the course honor code in completing homework assignments and take-home examinations. As detailed above, students are free to work together on the homework, but during exams communication with other students (by any means, including electronic communication) is strictly prohibited. You are expected to abide by the specified time limit for completing each exam, and you may not consult the text, homework solutions, or lecture notes during the exam (but you are allowed to use your Formula Summary Sheets, of course). The guidelines for each exam will be printed explicitly on the cover page, and the second page will be a statement that you must sign to indicate that you have abided by the Honor Code. You are not allowed to look at the exam before beginning the timed exam, so when printing out your exam please avoid the temptation to “sneak a peek.” Please do not discuss any of the exams with other students until *after* the deadline for that exam has passed.
- Posting Grades:** Homework and exam grades will be posted on ICON.

- COVID-19:**
- If you have symptoms consistent with COVID-19, stay home. Do not go to class or work while symptomatic. If you develop symptoms while on campus, go home or return to your dorm room. Call a health care professional who can assess your symptoms and risk factors and help you make a plan. **DO NOT** walk in to QuickCare, Student Health, any UI Health Care clinic, the State Hygienic Lab, or any emergency room. Consult your UI Health Care provider, Student Health, or personal health care provider to see if you need a COVID-19 test.
 - You will not be penalized for missing this class due to illness, and I will work with you to ensure that you are able to make up work as needed.
 - If you test positive for COVID-19, **you are strongly encouraged (though not required) to self-report via the university's online system at this link, Student Self-Report Form**

This is critical so that contact tracing can be performed to prevent further spread of the virus.

- Self-isolate according to Centers for Disease Control and Prevention (CDC) guidelines:
 - 10 days since first symptoms
 - At least 24-hours with no fever (without fever reducing medication) and
 - Symptoms improved
- Inform close contacts and assist the Johnson County Health Department with contact tracing.

Week	Weekly Reading	Class Meeting	Date	Lecture Notes	HW/Exam/Review
1	Arfken, Weber, & Harris Chapter 1 (p.1–82)	1	8/24	Lecture #1	
		2	8/26	Lecture #1/#2	
		3	8/28	Lecture #2	
2	Finish Reading Arfken, Weber, & Harris Chapter 1 (p.1–82)	4	8/31	Lecture #3	HW #1 due, 5:00pm
		5	9/2	Lecture #3/#4	
		6	9/4	Lecture #4	
3	Arfken, Weber, & Harris Chapter 2 (p.83–121)	7	9/7	Labor Day, No Lecture	HW #2 due, 5:00pm
		8	9/9	Lecture #5	
		9	9/11	Lecture #5 /#6	
4	Arfken, Weber, & Harris Chapter 3, Sections 3.1–3.9 (p.123–181)	10	9/14	Lecture #6	HW #3 due, 5:00pm
		11	9/16	Lecture #7	
		12	9/18	Lecture #7 /#8	
5	Arfken, Weber, & Harris Chapter 3, Sections 3.10 (p.182–203) Chapter 4, Sections 4.1–4.3 (p.205–226)	13	9/21	Lecture #8	HW #4 due, 5:00pm
		14	9/23	Lecture #9	
		15	9/25	Lecture #9 /#10	
6	Arfken, Weber, & Harris Chapter 4, Sections 4.4–4.7 (p.227–248)	16	9/28	Lecture #10	HW #5 due, 5:00pm
		17	9/30	Lecture #11	
		18	10/2	Lecture #11 /#12	
7	Arfken, Weber, & Harris Review Chapters 1–4 Review Lectures #1–11	19	10/5	Lecture #12	Midterm #1 due, 5:00pm
		20	10/7	Midterm #1 Review	
		21	10/9	No Lecture	
8	Arfken, Weber, & Harris Chapter 5, Sections 5.1–5.5 (p.251–291)	22	10/12	Lecture #13	HW #6 due, 5:00pm
		23	10/14	Lecture #13/#14	
		24	10/16	Lecture #14	
9	Arfken, Weber, & Harris Chapter 5, Sections 5.6–5.8 (p.292–297) Chapter 6, Sections 6.1–6.5 (p.299–324)	25	10/19	Lecture #15	HW #7 due, 5:00pm
		26	10/21	Lecture #15/#16	
		27	10/23	Lecture #16	
10	Arfken, Weber, & Harris Chapter 7, Sections 7.1–7.6 (p.329–369)	28	10/26	Lecture #17	HW #8 due, 5:00pm
		29	10/28	Lecture #17/#18	
		30	10/30	Lecture #18	
11	Chapter 7, Sections 7.7–7.8 (p.375–379) Chapter 8, Sections 8.1–8.5 (p.381–399) Chapter 9, Sections 9.1–9.3 (p.401–414)	31	11/2	Lecture #19	HW #9 due, 5:00pm
		32	11/4	Lecture #19/#20	
		33	11/6	Lecture #20	
12	Arfken, Weber, & Harris Chapter 9, Sections 9.4–9.8 (p. 414–445)	34	11/9	Lecture #21	HW #10 due, 5:00pm
		35	11/11	Lecture #21/#22	
		36	11/13	Lecture #22	
13	Arfken, Weber, & Harris Review Chapters 5–9 Review Lectures #12–21	37	11/16	Lecture #23	Midterm #2 due, 5:00pm
		38	11/18	Midterm #2 Review	
		39	11/20	No Lecture	
Thanksgiving Break (11/22–11/29)					
14	Arfken, Weber, & Harris Chapter 10, Sections 10.1–10.2, (p. 447–467) Chapter 23, Sections 23.1–23.2, (p. 1125–1147)	40	11/30	Lecture #23/#24	HW #11 due, 5:00pm
		41	12/2	Lecture #24	
		42	12/4	Lecture #25	
15	Arfken, Weber, & Harris Chapter 23, Sections 23.3–23.7, (p. 1148–1178)	43	12/7	Lecture #25	HW #12 due, 5:00pm
		44	12/9	Final Exam Review #1	
		45	12/11	Final Exam Review #2	
	Finals Week, 12/14–12/18		12/16		Final Exam due, 5:00pm

UI and the College of Liberal Arts and Sciences
INFORMATION FOR UNDERGRADUATES

Absences and Attendance

Students are responsible for attending class and for contributing to the learning environment of a course. Students are also responsible for knowing their course absence policies, which will vary by instructor. All absence policies, however, must uphold the UI policy related to student illness, mandatory religious obligations, including Holy Day obligations, military service obligations, unavoidable circumstances or University authorized activities. Students may use the CLAS absence form to aid communication with the instructor who will decide if the absence is excused or unexcused. The form is on ICON in the top banner under "Student Tools." More information is at <https://clas.uiowa.edu/students/handbook/attendance-absences>.

Academic Integrity

All undergraduates enrolled in courses offered by CLAS have, in essence, agreed to the College's [Code of Academic Honesty](#). Misconduct is reported to the College, resulting in suspension or other sanctions, with sanctions communicated with the student through UI email. Visit this page for information: (<https://clas.uiowa.edu/students/handbook/academic-fraud-honor-code>).

Accommodations for Disabilities

UI is committed to an educational experience that is accessible to all students. A student may request academic accommodations for a disability (such as mental health, attention, learning, vision, and physical or health-related condition) by registering with Student Disability Services (SDS). The student is then responsible for discussing specific accommodations with the instructor. More information is at <https://sds.studentlife.uiowa.edu/>.

Administrative Home of the Course

The College of Liberal Arts and Sciences (CLAS) is the administrative home of this course and governs its add/drop deadlines, the second-grade-only option, and related policies. Other colleges may have different policies. CLAS policies may be found here: <https://clas.uiowa.edu/students/handbook>.

Class Behavioral Expectations

Students are expected to comply with University policies regarding appropriate classroom behavior as outlined in the [Code of Student Life](#). This includes the policies and procedures that all students have agreed to regarding the Steps Forward for Fall 2020 in response to the COVID-19 pandemic. Particularly, all students are required to wear a face covering when in a UI building, including a classroom. In addition, the density of seats in classrooms has been reduced; in some instances, this will allow 6 feet or more between students while other cases, it may be less. Regardless, wearing a face covering and maintaining as much distance as possible are vital to slowing the spread of COVID-19. In the event that a student disrupts the classroom environment through their failure to comply with the reasonable directive of an instructor or the University, the instructor has the authority to ask that the student immediately leave the space for the remainder of the class period. Additionally, the instructor is asked to report the incident to the [Office of Student Accountability](#) for the possibility of additional follow-up. Students who need a temporary alternative learning arrangement related to COVID-19 expectations should contact [Student Disability Services arrangements/](#); +1 319 335-1462)

[\(https://sds.studentlife.uiowa.edu/fall-2020/covid-19-temporary-learning-arrangements/\)](https://sds.studentlife.uiowa.edu/fall-2020/covid-19-temporary-learning-arrangements/).

Class Recordings: Privacy and Sharing

Some sessions of a course could be recorded or live-streamed. Such a recording or streaming will only be available to students registered for the course. These recordings are the intellectual property of the faculty, and they may not be shared or reproduced without the explicit **written** consent of the faculty member. Students may not share these sessions with those not in the class; likewise, students may not upload recordings to any other online environment. Doing so is a breach of the Code of Student Conduct and, in some cases, a violation of the Federal Education Rights and Privacy Act (FERPA).

Communication and the Required Use of UI Email

Students are responsible for official correspondences sent to the UI email address (uiowa.edu) and must use this address for all communication within UI ([Operations Manual, III.15.2](#)).

Complaints

Students with a complaint about an academic issue should first visit with the instructor or course supervisor and then with the Chair of the department or program offering the course; students may next bring the issue to the College of Liberal Arts and Sciences; see this page for more information: <https://clas.uiowa.edu/students/handbook/student-rights-responsibilities>.

Final Examination Policies

The final exam schedule is announced around the fifth week of classes; students are responsible for knowing the date, time, and location of a final exam. Students should not make travel plans until knowing this information. No exams of any kind are allowed the week before finals with very few exceptions made (for labs, ESL and some world language courses, and off-cycle courses): <https://registrar.uiowa.edu/final-examination-scheduling-policies>.

Nondiscrimination in the Classroom

The University of Iowa is committed to making the classroom a respectful and inclusive space for people of all gender, sexual, racial, religious, and other identities. Toward this goal, students are invited in MyUI to optionally share the names and pronouns they would like their instructors and advisors to use to address them. The University of Iowa prohibits discrimination and harassment against individuals on the basis of race, class, gender, sexual orientation, national origin, and other identity categories set forth in the University's Human Rights policy. For more information, contact the Office of Equal Opportunity and Diversity (<https://diversity.uiowa.edu/eod>; +1 319 335-0705 or diversity.uiowa.edu).

Sexual Harassment

Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. All members of the UI community must uphold the UI mission and contribute to a safe environment that enhances learning. Incidents of sexual harassment must be reported immediately. For assistance, please see <https://osmrc.uiowa.edu/>.