

PHYS 308: Introductory Mathematical Physics
College of Arts & Sciences Syllabus

COURSE INFORMATION

Credit Hours: 3

Course Description:

Vector and tensor analysis, matrices and matrix algebra, ordinary differential equations with constant coefficients; Fourier series, introduction to complex variables.

Course Prerequisite:

Undergraduate level MATH 203 Minimum Grade of D and Undergraduate level PHYS 207 Minimum Grade of D

FACULTY INFORMATION

Instructor: Joseph E. Hibdon, Jr., PhD

Office Location: BBH 212A.

Office Hours: Monday and Wednesday 4:00pm-5:00pm. Tuesday and Thursday 4:30pm-5:30pm and 9:00pm-9:30pm. *Available for appointments as needed.*

Phone Extension: 773-442-5782.

E-mail: J-HibdonJr@neu.edu. (preferred)

COURSE MATERIALS**List of Required Texts / Materials:****Textbook**

Boas, Mary; *Mathematical Methods in the Physical Sciences*; 3rd Edition; ISBN # 978-0471198260; Publisher: John Wiley & Sons.

(There are electronic versions available for discounted prices.)

Materials

- 8.5" x 11" white lined paper with no perforated edges and a stapler [**Required**]
- Three ring binder – for notes, homework, and handouts. [**Suggested**]

COURSE OBJECTIVES / STUDENT LEARNING OUTCOMES

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This syllabus may change at any time. Any changes that occur will be announced in class.

Course Objectives

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Upon successful completion of this course, students will be able to:

1. Use partial differentiation to solve optimization problems and understand the physical interpretation of partial derivatives.
2. Understand vector calculus and the use in physical application.
3. Solve for eigenvalues and eigenvectors and understand how they are used in solving systems of differential equations
4. Conduct analysis of differential equations using Laplace transform, and understand how differential equations are used in Physics
5. Become familiar with the use of complex numbers and variables
6. Basic understanding of special mathematical functions that occur in physical problems.

Topics

1. Partial Derivatives and Optimization Problems
2. Multiple Integration and Vector Analysis
3. Complex Numbers
4. Linear Algebra, Eigenvalues, and Eigenvectors
5. Fourier Series and Transforms
6. Ordinary Differential Equations
7. Series Solutions of Differential Equations and Special Functions

STUDENT TASKS / ASSIGNMENTS / REQUIREMENTS

Assignments:

Homework

Homework: Homework will be assigned regularly and selected problems will be graded.

Assignments are due at the **beginning** of class on the indicated day. No late homework will be accepted since select solutions may be made available after the deadline. If you are sick or must otherwise miss a class, I will accept work brought in by a classmate, brought to my office, or scanned and emailed to me before the due date. **Finally, all homework assignments must be typed *or* neatly handwritten in pencil on standard 8.5" x 11" white lined paper with no perforated edges and all the sheets must be stapled.** Problems must be in sequential order and answers must be circled. I reserve the right to return assignments not conforming to these standards ungraded.

It is essential that you devote a significant amount of time to homework (**at least 6 to 8 hours per week**) and complete homework assignments. It is also important to read the book. Quizzes and exams will consist of similar problems and each week we will spend a significant amount of class time discussing problems similar to the homework. In-class discussions will not be beneficial to you if you have not already completed homework assignments.

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Comment about Collaboration: The purpose of the homework is for you to engage in learning the methods, techniques, and problem-solving skills in the course. It is acceptable to discuss the course material and work on problems with other students. However, each student must write up his or her own solutions. You may not consult on-line answer keys, discussion boards, or solution sets from previous semesters to help you with your homework. Though collaboration is allowed, you should never copy work. To work outside these bounds may result in being brought before an academic violation board. Please also refer to the *University Student Conduct Code* for more information on cheating and plagiarism.

Grading: Homework will be graded on both completion and correctness. For a given assignment, 3 random problems will be selected and graded for 6 points (total) and then 4 points will be given for completeness. These completed problems will each receive a 2 (correct), 1 (good faith attempt), and 0 (did not do, or poorly attempted) points. The total homework score will be a combination of scores from graded problems 4 (all problems attempted), 3 (all attempted, but poorly done), 2 (missing problems), 1 (missing a lot of problems, poorly done), 0 (less than 25% of problems attempted).

Quizzes -

Quizzes: There will be quizzes on a regular basis at the start of class. If you are late then you will not be allotted the whole time for the quiz. No makeup quizzes will be given for any reason. Quiz topics will cover in-class and homework material and generally will have vocabulary you need to identify. I will announce in class the topic on the quiz the class period before the quiz (see the detailed schedule below).

Exams – Midterm and Final Exam

Exams: There will be one exam and a cumulative final exam during the semester. The final exam will occur on **December 12, 2018 from 6:00-7:50pm**. I expect all students to take exams at the scheduled times. If there is an unavoidable conflict, please contact me in advance so alternate plans can be made. Except in exceptional circumstances, an unexcused missed exam will count as a 0 in the grade book. **Family, work, or holiday travel plans will not be accommodated for exams.**

Participation

Participation: This portion of your grade is based on engagement in the classroom, as well as preparedness for class, peer group work, and attendance - which includes being on time for class. Your engagement, attendance, participation, and effort will be monitored throughout the semester. These points will go to extra credit that will be added to your homework grade. While I don't encourage it, missing class is sometimes unavoidable, and repeated absences will affect this part of your overall grade. **Cell phones should be turned off before class begins.** If I see you using your cell phone and/or texting in class, you may be asked to leave class, and you will be given an unexcused absence for the day. If you are expecting an emergency call or text during class, let me know, so we can discuss an exception to this policy for that class.

Grading Policies and Formulae:

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In this class, we will use the standard grading scale: A: 90%-100%, B: 80%-89%, C: 70%-79%, D: 60%-69%, F: 0%-59%. Individual grades will be based on participation, homework, quizzes, three exams, journal, and report (graduate students only). Your final grade will be calculated the following way:

Category	Points	Percentage of Overall Grade
Homework	140	18.6%
Quizzes	160	21.3%
Midterm	150	20%
Cumulative Final	300	40%
TOTAL:	750	100%

NOTE: Though each component has a different weight, this is not a “buffet.” A zero in any one component will result in an automatic dropped letter grade (in addition to the 0% in that column of the grade book). Extra Credit will be given for going to academic talks or other assigned events on campus. If for some reason you can never take advantage of these opportunities please let me know ASAP!

Course Outline:

The following is a preliminary schedule. Please be advised that this is subject to change at all times. You will be notified when the changes will occur in class or via email.

Week 1:

August 27 – Introduction / Partial Differentiation

August 29 – Partial Differentiation / Multiple Integration / HW #1 Due

Week 2:

September 3 – No Class (Labor Day)

September 5 – Multiple Integration / HW #2 Due / Quiz #1

Week 3:

September 10 – Vector Analysis

September 12 – Vector Analysis / HW#3 Due

Week 4:

September 17 – Vector Analysis

September 19 – Vector Analysis / HW#4 Due / Quiz #2

Week 5:

September 24 – Vector Analysis

September 26 – Vector Analysis / HW #5 Due / Quiz #3

Week 6:

October 1 – Complex Numbers / Complex Variables

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October 3 – Complex Variables / HW #6 Due

Week 7:

October 8 – Fall Break/ No Class

October 10 – Complex Variable / HW #7 Due / Quiz #4 / Midterm Review

Week 8:

October 15 – Complex Variables / Midterm Review

October 17 – Midterm

Week 9:

October 22 – Linear Algebra

October 24 – Linear Algebra / HW #8 Due / Quiz #5

Week 10:

October 29 – Fourier Series

October 31 – Fourier Series / HW#9 Due

Week 11:

November 5 – Ordinary Differential Equations

November 7 – Ordinary Differential Equations / HW #10 Due / Quiz #6

Week 12:

November 12 – Ordinary Differential Equations

November 14 – Ordinary Differential Equations / HW #11 Due

Week 13:

November 19 – Ordinary Differential Equations

November 21 – Ordinary Differential Equations / HW #12 Due / Quiz #7

Week 14:

November 26 – Tensor Analysis

November 28 – Tensor Analysis / HW #13

Week 15:

December 3 – Tensor Analysis

December 5 – Tensor Analysis / Quiz #8 / HW #14

Week 16:

December 10 – Review of the Final

December 12 – 6:00-7:50pm Final Exam

COURSE POLICIES AND STATEMENTS

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Absence Policy:

You are permitted **two** absences during the semester before any penalty is placed (notice, there is no such thing as “excused” or “unexcused” absence in this policy). Each additional absence will result in a half a letter grade reduction in your final participation grade, and **two** tardies will count as an absence. If missing a class is unavoidable, you should notify me in advance, copy the notes from a classmate, and read them before returning to class. I am happy to answer questions once you've read over the notes, but I will not repeat my lecture during office hours. In addition, attending class will allow you to remain cognizant of which portions of the material have been emphasized and as such are likely to appear on the various examinations. If for some reason you have an extended illness or situation requiring a lengthy absence, let me know as soon as possible so we can discuss accommodations.

Academic Integrity Policy:

By enrolling in this course, you are bound by the NEIU Student Code of Conduct: <http://www.neiu.edu/university-life/student-rights-and-responsibilities/student-code-conduct>. You will be informed by your instructor of any additional policy specific to your course regarding plagiarism, class disruptions, etc.

ADA Statement:

Northeastern Illinois University (NEIU) complies with the Americans with Disabilities Act (ADA) in making reasonable accommodations for qualified students with disabilities. To request accommodations, students with special needs should make arrangements with the Student Disability Services (SDS) office, located on the main campus in room D104. Contact SDS via (773) 442-4595 or <http://www.neiu.edu/university-life/student-disability-services>.

Campus Safety:

Web links to Campus Safety: Emergency Procedures and Safety Information can be found on NEIUport on the MyNEIU tab or as follows: http://homepages.neiu.edu/~neutemp/Emergency_Procedures/MainCampus/.

ADDITIONAL ELECTIVE INFORMATION**Learning Support Center**

The Learning Support Center (LSC) provides peer-directed academic tutoring for individuals and groups in the following areas:

- General Education courses
- Writing
- Reading
- Math Development and college level math

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- Academic Coaching

The primary emphases are promoting active learning strategies, encouraging student engagement, and providing content support. Academic support is provided to students who are seeking assistance with understanding course concepts and preparing assignments, along with developing an improved learning system for college which includes motivation, academic engagement, brain-based habits for college learning, and learning strategies for note taking, textbook reading, and test taking.

Tutors are graduate and undergraduate students who are carefully selected on the basis of their own academic achievement by faculty and given supervision, training, and support to serve as tutors, mentors, and academic coaches. Additionally, the LSC provides all NEIU students an area for learning groups and an opportunity to learn with other students. Appointments are strongly encouraged, and students are welcome to drop in to discuss their individual academic support needs.

For more information, visit the LSC website at www.neiu.edu/lsc or, to schedule an appointment with a tutor, call 773-442-4568.

Course Communication

All pertinent class communications between the instructor and students is conducted exclusively through NEIU e-mail. Thus it is the responsibility of students to check their NEIU e-mail account for all significant information and updates on class cancellations in the event of threatening weather conditions. **Communication between the instructor and students via personal e-mail accounts (e.g., @gmail.com or @yahoo.com) will not occur.** All documentation will be posted on Desire2Learn or handed out during class.

Incompletes

Incomplete Grade Policy: An Incomplete (“I”) grade is temporary and exceptional, and can be given only to students whose completed coursework has been qualitatively satisfactory but who have been unable to complete all course requirements because of illness or other circumstances beyond their control. An “I” grade is not to be awarded in place of a failing grade or when the student is expected to attend additional class meetings or to re-register to complete the course requirements. Additionally, an “I” grade is not a means for the student to raise his/her grade by doing additional work.

A request for an “I” grade must be made by the student to the faculty member before the last official day of the semester or term. The faculty member retains the right to make the final decision on granting a student’s request for an “I” providing the student meets the provisions above, even though the student may meet the eligibility requirements for this grade. Students have up to one semester, excluding Summer, to complete the work.

It is the responsibility of the student to complete and submit the remaining coursework before the assigned deadline. The faculty member will submit a grade change converting the “I” to a letter

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grade by or before the last day of the semester in which the outstanding coursework is to be completed. If the student does not meet the deadline, the “I” will be converted automatically to a final grade of an “F”. Since the “I” grade is temporary, faculty may not issue a terminal “I” grade.

Upon receipt of the grade change, the Registrar Services Office will post the grade to the student’s record and recalculate the GPA. Although students have up to one semester, excluding Summer, to complete the work to change the grade of Incomplete, the student’s academic standing will be reassessed only if the grade change is received by the Friday of the first full week of the semester immediately following the one in which the “I” grade was assigned.

Students will not be allowed to graduate with “I” grades on their records.

Extension of an Incomplete Grade: A request to extend the assigned deadline must be put in writing to the appropriate academic dean before the assigned “I” grade becomes a failing grade. The request must provide the reason as to why a deadline extension is requested, along with including appropriate documentation (e.g. medical documentation, etc.). A letter of support from the faculty member that includes a new deadline date is also required. The Dean or his/her designate will make the appropriate decision at his/her discretion and reply in writing to the student, faculty member, and the University Registrar within 14 working days. Requests that extend beyond one calendar year from the time the incomplete grade was assigned will not be honored.

These policies apply to “I” grades given in the Fall 2016 semester or later.

Late Work

Late work is not allowed. This late work policy applies to all graded assessments (including the final examination) in the course, with the exception of the discussion threads. Because class discussions require us all to participate during the week when they are active, no make-up or late credit will be allowed for discussion participation. I understand that unexpected things can come up, so the late-work policy for our course is outlined below. (The reason no late work is accepted, is that solutions to all assignments will be posted the day the work is due so that the solutions may be used as a guide for future material.)

Serious Emergencies: For serious emergencies, your instructor will decide whether your late work may be accepted for full or reduced credit. Serious emergencies include things like serious illness, accidents, natural disasters, and university server outages. E-mail your instructor the information about your emergency and request approval to make up the assignment, lab, quiz, or exam before it is due. If you receive approval, make up the work according to the plan set by you and your instructor.

All Other Unexcused Late Work: Unexcused late work includes course work that is turned in late because of things like job-related, technical, or other personal issues. Late work will not be graded but can be discussed in office hours.

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Submission of Assignments: Students are expected to complete all assignments. Failure to submit any assignment will result in a zero on that assignment and an additional deduction of 10 points per missing assignment. If homework solutions are shared with the class, your instructor reserves the right to decline to accept late work after the sharing of the solutions, or to require that an alternative assignment be completed, if one is available.