AMSC/MATH 673, Sec. 0101: Partial Differential Equations I
Department of Mathematics, UMCP **Fall 2024**
Handout: COURSE SYLLABUS AND POLICIES (4 pages) **Date:** 08/26/2024

Lectures: CHE 2145 (Chem. & Nuclear Eng. Bldg.) **Time:** TueThu 11:00am–12:15pm
Note: Lectures are **in person**. No recording is planned.

CONTACT INFO:
Instructor: Dio Margetis; e-mail: diom@umd.edu
Office: 2106 Kirwan Hall; phone: 5-5455.
Instructor's Homepage: https://www.math.umd.edu/∼diom/

Office hours: (i) In person: Tuesdays 12:15pm-1:00pm (after class); **(ii) on Zoom:** Wednesdays 5:00pm-5:45pm; or **(iii) by appointment**. Office hours *start on Tue 09/03/24*.
Zoom meetings for instructor's office hour are scheduled through ELMS/Canvas.
Students are encouraged (but not required) to wear KN95 face masks during in-person meetings. Students at instructor's office hours should have *specific and well-defined* questions.

Grader: Michael Rozowski; e-mail: mrozowsk@umd.edu
Grader's Office hour: Time & Place: TBA

ELMS/Canvas: This platform will be used for part of the course. For example, the details of the Zoom meetings (ID and passcodes) for office hours should be found there. Only authenticated UMD users will be allowed to join Zoom meetings. **This syllabus along with the Homeworks** will be posted there. To access ELMS, go to http://myelms.umd.edu; log in using your UMD username & password.

PREREQUISITES: MATH411; or, course with comparable content (students may contact the dept. to inquire.) MATH/AMSC 673 requires strong familiarity with proofs. Some reviews will be given in class as needed. Ask for the instructor's advice if you are in doubt.

TEXT: L. C. Evans, *Partial Differential Equations*, AMS, 2nd Ed. Reading and some (but not all) problems will be assigned regularly from this text. In addition, I might use some material from: F. John, *Partial Differential Equations*, Springer, 4th Ed. A list of texts for students who want to pursue further reading is listed in instructor's homepage;
see https://www.math.umd.edu/∼diom/courses/673/index.html

Course Web page: https://www.math.umd.edu/∼diom/courses/673/
To access it, **go to my homepage (above) – click on Teaching & then find course.**
(However: All homeworks will be posted at ELMS/Canvas.)

SCOPE & TOPICS: Concepts and analytical methods that permeate the rigorous theory of PDEs, especially "applied PDEs" which arise in applications.

Tentative plan: Introduction: Classical and weak solutions. Major linear PDEs. *Transport equation*: Initial-value problem; nonhomogeneous problem. *Laplace and Poisson equations*: Derivations; boundary value problems; fundamental solution; maximum principle; properties of harmonic functions; Green's function; energy methods. *Heat equation*: Derivations; initial

value problems; fundamental solution; properties and estimates; energy methods. *Wave equation*: Derivations; initial value problems; d'Alembert formula; solution by spherical means; nonhomogeneous problem; energy methods. Applications in mechanics.

Nonlinear first-order PDE: Complete integrals; characteristics; Hamilton-Jacobi equations; conservations laws; shock formation and entropy condition; weak solutions; the Riemann problem. Applications in gas dynamics, materials science and fluid mechanics.

Special representation of solutions: Conversion of nonlinear to linear PDE (Hopf-Cole transform, hodograph and Legendre transforms). Applications to fluids and quantum mechanics.

A course description is given on the Mathematics Department webpage at:
https://academiccatalog.umd.edu/graduate/courses/math/

GRADING POLICY: NO FINAL EXAM. Grades will be based on **two midterm exams** and 5-7 sets of homeworks. Each set will be due about 2 weeks after the date it is handed out.

You can take the course for 3 credits; or audit it. You are expected to write your *own* solutions if you take the course for credit. *The same amount of homework is expected from each student who takes the course for credit.*

The final grade of each student will be determined based on the following breakdown:

Homeworks: 60%
Exams (1–2): 40% (20% each)

EXAMS: NO FINAL EXAM. There will be **two midterm exams** on the following dates:

- **Exam 1: Tuesday, Oct. 15**, in class.
- **Exam 2: Thursday, Nov. 14**, in class.

Word of Caution: Students who miss exams may take risks in regard to their grades; and will be called upon to explain or might be advised to drop course. **Test papers must be legible and clear. Illegible papers won't be graded.**

Make-up exam: By Oral Exam. If you are absent from any scheduled exam and you have provided a *valid, acceptable, verifiable* note for the reason of your absence, **you will be given the chance to make up for this missed exam through an Oral Exam**; see also under Excused Absences below. The time of this make-up oral exam will be decided upon jointly with the Instructor, and must be close to the missed exam. In case of medical or family emergency, please contact the Instructor as soon as is practical, preferably before the exam. **For any medically necessitated absence, you must provide verifiable documentation signed by a qualified health care provider, to take a make-up exam.** (Documentation or "notes" from nurses, vaguely defined assistants or staff members etc won't be accepted at first glance and will be scrutinized). The instructor will NOT grant a make-up exam without valid documentation.

Note: If the student is registered with the **Accessibility & Disability Service (ADS)**, the student will take a proctored, written (not oral) make-up final exam at the ADS, if the student proves excused absence.

Exams policy: No calculators are allowed during exams. Your answers must amply demonstrate mathematical reasoning (for full credit). Explanations in your test papers must be given in coherent English sentences. Minor algebraic and numerical errors, such as missing a sign, which are not symptomatic of a conceptual misunderstanding, will be penalized minimally. Egregious errors, such as $\frac{1}{a+b} = \frac{1}{a} + \frac{1}{b}$, will be penalized **severely**.

HOMEWORKS: There will be 5-7 sets of required homeworks. Once assigned, the homeworks must be turned in by the date specified, **in class**. **Late homeworks will not be accepted**. Your solutions are required to be *legible and clear*. **Illegible solutions will not be graded. The instructor will notify students whose homeworks are illegible or grossly incomplete.** Solutions won't be distributed.

Since the course aims to sharpen your ingenuity and analytical skills, there is no need for calculators for homeworks. Calculators are *prohibited unless stated otherwise in a homework*.

Submissions: Homeworks should be turned in **in person**, in class, in a TIMELY FASHION.

Word of Caution: Students who unjustifiably do not return homeworks take risks regarding their grades; and will be called upon to explain and might be advised to drop the course. **Any request for extension of deadline for homework is subject to university rules for: integrity of the course and close pursuit of its academic goals; and fairness for all students.** Thus, I may pose severe restrictions on or even refuse granting an extension, if I deem that accepting the initial request may compromise such rules. IF requests for excused absences affect assignments, documentation for justification will be asked strictly.

Note: If you feel that you are entitled to more points on an exam or homework, you may **resubmit your paper** with a note explaining why your grade should be changed. (Since each questioned problem will be very carefully reexamined, it is possible that you could end up losing points in the re-evaluation process.) The request for re-evaluation is overdue if it is made later than 5 days after the return of the (graded) paper. An exception concerns the last homework, for which the allowed time for re-evaluation submission is 2 days. The Instructor and grader reserve the right to **disregard your paper resubmission if they deem this is overdue or unsubstantiated**.

WORKING TOGETHER & ACADEMIC INTEGRITY. All work that you submit must be your own. You are welcomed to discuss homework material with each other in a general way, but you may not consult any one else's written work. Any marked similarity in form between submissions with different authors might be regarded as evidence of academic dishonesty. You must cite any reference you use and clearly mark any quotation or close paraphrase that you include. Such citation will not lower your grade, although extensive quotation might. **Homeworks and exams should be done individually.**

You are expected to read carefully and adhere to the following instruction.

The University of Maryland, College Park has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit

https://policies.umd.edu/student-affairs/university-of-maryland-code-of-student-conduct

To further exhibit your commitment to academic integrity, remember to sign the Honor Pledge on all exams: *"I pledge on my honor that I have not given or received any unauthorized assistance on this examination (assignment)."*

Additional note for MATH/AMSC 673: You will not be asked to sign such a pledge on assignments, but you are expected to adhere to the principles of the pledge there.

DISABILITY (ADS) SUPPORT: Students with documented disabilities should notify the Instructor and discuss the corresponding accomodations according to policies of the Accessibility & Disability Service (ADS) **by the 2nd week of classes.**

UNIVERSITY POLICIES: In general, it is our shared responsibility to know and abide by the UMD's policies. General policies on Courses of the Graduate School are found here:

https://gradschool.umd.edu/course-related-policies

Topics include academic integrity, student and instructor conduct, accessibility and accommodations, attendance and excused absences, grades and appeals, intellectual property.

STUDENT RESOURCES & SERVICES. Taking personal responsibility for your own learning means acknowledging when your performance does not match your goals and doing something about it. I hope you will come talk to me so that I can help you find the right approach to success in the course; and I encourage you to visit https://tutoring.umd.edu to learn more about the wide range of campus resources available to you.

You should also know there is a wide range of resources on campus to support you in various ways (see for example UMD's Student Resources and Services website).

For confidential counseling, students are advised to visit or contact the UMD Counseling Center (see https://counseling.umd.edu); or one of many other mental health resources on campus.

COVID-19 related policy: For the HEAL line and COVID-19 information, see

https://health.umd.edu/HEAL#masks

On Excused Absences: The University policy on excused absences can be found at: https://policies.umd.edu/student-affairs/university-of-maryland-policy-on-excused-absence

RELIGIOUS OBSERVANCES. If you plan to be absent from class because of religious observances, please submit to Instructor a list of the dates in the first week of classes.