MATH 858M: Asymptotic Methods (with Applications)
Department of Mathematics, UMCP
Handout 1: COURSE SYLLABUS AND POLICIES
Spring 2022
Updated: 01/29/2022

Lectures: PHY 4221 (John S. Toll Physics Bldg)
Time: TuTh 9:30am–10:45am

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.
   In the first week of classes, the lectures will be delivered by Prof. Grillakis.
   Homepage: https://www.math.umd.edu/~diom/
Office hours: (i) In person: Tuesdays 11:00am-11:45am (after class); (ii) on Zoom:
   Wednesdays 5:00pm-5:45pm; or (iii) by appointment. Office hours start on Tue 02/01/22.
   Zoom meetings for instructor’s office hour are scheduled through ELMS/Canvas.
   Students showing up at instructor’s office hours should have specific and well-defined questions.
Grader: TBA as soon as the info becomes available; e-mail: TBA
Grader’s Office hour: Time: TBA
Possible Zoom meetings for grader’s office hour will be scheduled through ELMS/Canvas.

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 authenti-
cated UMD users will be allowed to join Zoom meetings. This syllabus along with lecture
notes will be posted there. To access ELMS, go to http://myelms.umd.edu; log in using your
UMD username & password.

PREREQUISITES: The course is largely self-contained but also requires some self-study
on the way. Knowledge of multivariable calculus is necessary. Some knowledge of complex
variables and differential equations will be helpful. The UMD courses MATH 241, 246, 462,
and 463, for example, would suffice, but they are not required. Handouts with reviews will be
distributed in class as needed. Ask for the instructor’s permission/advice if you are in doubt.

TEXT: No required text. A recommended text is:

Course Web page: https://www.math.umd.edu/~diom/courses/858M/
   To access it, go to my homepage (above) – click on Teaching & then find course.
   All homeworks will be posted there.

SCOPE & TOPICS: Mathematical concepts and tools that permeate models in various areas
of the physical sciences and engineering. Emphasis is placed on approximation theory in
the context of ODEs, PDEs and difference equations. A goal is to help students formulate
and solve quantitative problems of science and engineering, from the atomic to the macro-
scopic scale. Applications include problems from fluid and solid mechanics, elasticity, elec-
romagnetism, mathematical biology, quantum mechanics, condensed-matter and atomic physics.
PART I. Convergent, asymptotic and formal series expansions. Symbolic computing.

PART II. Matched asymptotic expansions & perturbation series for ODEs, PDEs, and difference eqs: Regular and singular perturbations. Boundary layer theory.


Applications: Nonlinear waves in optics, fluid & gas dynamics; nonlinear diffusions in materials; scattering and bound states in quantum mechanics; porous media; homogenization of composites; cloaking in acoustics and optics; plasmonic crystals and epsilon-near-zero effect.

GRADING POLICY: NO exams or tests. Grades will be based exclusively on 5-6 problem sets (homeworks). Each set will be due (usually) 2 weeks after the date it is handed out.

You can take the course for 1-3 credits; or audit it. You are expected to write your own solutions if you take the course for credit. The amount of homework expected from each student depends on the number of credits.

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. Solutions won’t be distributed by instructor.

Since the course aims to sharpen your ingenuity and analytical skills, there is no need for calculators for the homeworks. Accordingly, calculators are not recommended.

Submissions: Homeworks should be turned in in person, during class lectures.

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.

If you feel that you are entitled to more points on a 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.) Any request for re-evaluation is overdue if it is made later than 5 days after the return of the (graded) paper. 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 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://studentconduct.umd.edu/home/current-students

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

**Additional note for MATH 858M:** 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.

**UNIVERSITY POLICIES:** General policies on Courses are found here: http://ugst.umd.edu/courserelatedpolicies.html

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

**COVID-19 related policy:** KN95 masks are required in all classroom settings and recommended everywhere. “Face coverings over the nose and mouth are required while you are indoors at all times. There are no exceptions. Students not wearing a mask will be given a warning and asked to wear one, or will be asked to leave the classroom immediately. Students who have additional issues with the mask expectation after a first warning will be referred to the Office of Student Conduct for failure to comply with a directive of University officials.”

**On Excused Absences:** The University policy on excused absences can be found at: https://policies.umd.edu/policy/9abcecc4-1d3a-41a1-8d50-033655a3d486/

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

**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.

**COUNSELING.** For confidential counseling and help with personal issues, students are advised to contact the UMD Counseling Center, 301-314-7651; https://www.counseling.umd.edu