

# Syllabus for MATH 3423, Physical Mathematics II, Sec. 001

## Fall 2019

**Lectures:** TR 10:30–11:45 a.m. in 809 PHSC

**Class web page:** [http://www2.math.ou.edu/~npetrov/math3423\\_f19.html](http://www2.math.ou.edu/~npetrov/math3423_f19.html)

**Instructor:** Prof. Nikola Petrov, [npetrov@ou.edu](mailto:npetrov@ou.edu), 1101 PHSC

**Office Hours:** Tue 9:30–10:30 a.m., Wed 12:00–1:00 p.m., or by appointment, in 1101 PHSC

**Course catalog description:** The Fourier transform and applications, a survey of complex variable theory, linear and nonlinear coordinate transformations, tensors, elements of the calculus of variations. (F, Sp)

**Prerequisite:** MATH 2443 (Calc and Analytic Geom IV) or MATH 2934 (Diff & Int Calc III), MATH 3413 (Physical Math I).

**Text:** D. A. McQuarrie, *Mathematical Methods for Scientists and Engineers*, University Science Books, Sausalito, CA, 2003. The course will cover parts of chapters 4, 8–10, 15, 17–20.

**Course Objectives:** This course follows the objective of its pre-requisite course Physical Mathematics I to provide an introduction to a variety of mathematical topics important to students studying physics and related disciplines. Topics covered will include elementary calculus of variations, complex numbers and functions, basic linear algebra (matrices, determinants, inner product spaces, eigenvalues and eigenvectors, change of basis, and diagonalization), nonlinear coordinate systems, Fourier transforms with applications to PDEs, calculus of functions of a complex variable (differentiation, Cauchy-Riemann equations, complex integration and Cauchy's theorem and integral formula, Taylor and Laurent series, residues and the residue theorem, conformal mapping and applications).

**Grading:** Your grade will be based on the following:

Homework assignments (lowest grade dropped)	15 %
Three midterm exams	19 % each
Final exam	28 %

Course grades will be assigned by calculating the total for each student in the class, listing the totals in rank order, and assigning grades according to a reasonable total needed for each letter. After each in-class examination, I will announce tentative grades, so by the middle of the course you will have a good idea of where you stand, and what is required for a given grade.

**Exam dates:**

Exam 1	Thursday, September 19, in class
Exam 2	Thursday, October 24, in class
Exam 3	Tuesday, November 26, in class
Cumulative Final Exam	Tuesday, December 10, 8:00–10:00 a.m.

No books, notes, or electronic devices of any kind may be used during exams. Do not make travel plans that prevent you from taking any of the tests or the final exam at the scheduled time. If you have a legitimate reason for missing an exam that can be documented independently of your testimony (e.g., via a note or phone call from a doctor or a parent), you must contact me prior to the exam, in order to make an alternative arrangement. I am very fastidious about such matters, so don't expect such arrangements unless you have a compelling excuse that meets the above conditions (especially the "prior notice" part).

**Attendance:** You are expected to attend all lectures, and you are responsible for all information given out during them. You are expected to arrive on time for the lectures, properly prepared and in good physical condition – in particular, adequately rested and up to date on the course material – so that you can maintain full concentration for the entire lecture.

All electronic equipment should be turned off before the start of every lecture, and should remain off until the class is dismissed. Since learning calculus requires your full attention, activities such as *conversing with other students, eating, sleeping, reading a newspaper, listening to headsets, using computers, cell phones, or other electronic devices, are not allowed!*

**Homework:** The homework assignments will be given regularly throughout the semester on the class web site. Each homework will consist of several problems, of which *some* chosen pseudo-randomly will be graded. Your homework solutions must be submitted to me at the beginning of class on the due date. Giving just an answer to a problem is not worthy any credit – you have to write a complete solution which gives your step-by-step reasoning and is written in grammatically correct English. Although good exposition takes time and effort, writing your thoughts carefully will greatly increase your understanding and retention of the material. The grader has the right to refuse to grade a homework paper that is illegible or excessively sloppy. *Your lowest homework grade will be dropped.*

*The problems in your homework should be in the order listed in the assignment, and the sheets should be stapled. No late homework will be accepted!*

You are encouraged to discuss the homework problems with other students, but you should write up the solutions in your own words. Copying solutions from a solutions manual, from someone else's work, or from the Internet is a complete waste of time, as you will not learn the material adequately, and you will pay a heavy price on the exams which constitute 85 % of your course grade.

#### **Some important dates:**

- (1) Last day to withdraw with an automatic  $W$ : November 8, 2019 for undergraduate students and September 27, 2019 for graduate students.
- (2) Last day to withdraw without petition to the Dean: November 8, 2019 (for graduate students a  $W/F$  grade is assigned for withdrawals processed during the period September 30–December 6).
- (3) Labor day (no classes): September 2, 2019.
- (4) Thanksgiving vacation (no classes): November 27–December 1, 2019.
- (5) Last day of classes: December 6, 2019.

**Policy on  $W/I$  grades:** Through the end of the sixth week of the semester, students can withdraw from the course with an automatic  $W$ . Between the seventh and tenth weeks of the semester, undergraduate students can continue to withdraw with an automatic  $W$ , but graduate students must obtain the instructor's signature on the University's "drop form" to withdraw from the course, and along with the signature the instructor must indicate whether the student is passing or failing at the time of the withdrawal. After the tenth week of the semester, all students can only withdraw via petition to the Dean of their college. The petition process also requires the instructor's signature with a passing-failing indication at the time the petition is filed. Note that a "failing" indication on the petition means that even if the petition is approved the grade in the course will be weighted in the GPA as an  $F$ .

The grade of  $I$  is not intended to serve as a benign substitute for the grade of  $F$ , and is only given if a student has completed the majority of the work in the course at a passing level (for example everything except the final exam), the course work cannot be completed because of compelling and verifiable problem beyond the student's control, and the student expresses a clear intention of making up the missed work as soon as possible. Moreover, current OU policies require that instructors and the affected students execute a written "Incomplete Contract" before a grade of  $I$  can be given. The contract makes clear: (1) what work

is to be made up; (2) when the make-up work must be completed (which cannot be more than one calendar year from the assignment of the *I*); and (3) *what alternative grade will be assigned if the make-up work is not completed*. If the make-up work specified in the contract is not made up within one calendar year, then the alternative grade specified in the contract will be entered on the student's transcript. Thus the *I* grade does not become permanent on the transcript if it is not made up within one year.

**Academic Misconduct:** All cases of suspected academic misconduct will be reported to the Office of Academic Integrity Programs as possible violations of University's Academic Integrity Code. If the violation is confirmed by the Academic Integrity Program's Office, the penalties can be quite severe, so the best advice is **Don't do it!** For more details on the University's policies concerning academic misconduct consult the link

<http://www.ou.edu/integrity>

This link also has information about admonitions (essentially warnings about potential misconduct for fairly minor infractions) and your rights to appeal charges of academic misconduct.

Students are also bound by the provisions of the *OU Student Code*, available at

<https://www.ou.edu/content/dam/studentlife/documents/AllCampusStudentCode.pdf>

**Students with disabilities:** The University of Oklahoma is committed to providing reasonable accommodation for all students with disabilities. Students with disabilities who require accommodations in this course are requested to speak with the instructor as early in the semester as possible. Prior to receiving accommodations in this course, students with disabilities must be registered with the Disability Resource Center, 730 College Avenue, phone 405-325-3852.

Caminante, son tus huellas  
el camino y nada más;  
caminante, no hay camino,  
se hace camino al andar.  
Al andar se hace camino,  
y al volver la vista atrás  
se ve la senda que nunca  
se ha de volver a pisar.  
Caminante, no hay camino,  
sino estellas sobre la mar.

Traveler, your footsteps  
are the road and nothing more;  
traveler, there is no road,  
the road is made by walking.  
By walking the road is made  
and when we turn to look back  
we see the path that  
will never be traveled again.  
Traveler, there is no road,  
only tracks of foam on the sea.

From *Proverbios y Cantares*, Antonio Machado (1875–1939)