

MATH 4581  
CLASSICAL MATHEMATICAL METHODS IN ENGINEERING  
COURSE SYLLABUS  
FALL 2018

INSTRUCTOR: ANDRZEJ SWIECH

LECTURES: MWF 12:20-1:10 PM, SEB 110

OFFICE: SKILES 206

OFFICE HOURS: M 4:00-5:00 PM, T 1:30-2:30 PM, W 2:00-3:00 PM

PHONE: 404-894-2705

E-MAIL: swiech@math.gatech.edu

COURSE WEB PAGE: <https://people.math.gatech.edu/~swiech/4581f18.html>

TEXTBOOK: D. L. Powers, *Boundary Value Problems and Partial Differential Equations*, 6th edition, Elsevier Academic Press, 2010.

MATERIAL TO BE COVERED AND COURSE OBJECTIVES: The primary objective of the course is to introduce the student to certain analytic methods for solving partial differential equations. The main tools we will focus on are Fourier series, the method of separation of variables, and the Laplace transform. We plan to cover the following material:

- (1) Vector spaces, norms, inner products, orthogonal projections, the space  $L^2(a, b)$ , Fourier series, Fourier integral.
- (2) The Sturm-Liouville theorem.
- (3) Heat equation: derivation and the method of separation of variables.
- (4) Wave equation: D'Alembert's solution, separation of variables.
- (5) Laplace and Poisson equations: separation of variables in polar and cylindrical coordinates, method of eigenfunction expansion.
- (6) Laplace transform: basic properties, applications to ordinary differential equations.
- (7) Further applications of the Laplace transform: heat flow problems in half spaces, motion of semi-infinite string.

HOMEWORK: Suggested homework problems are posted on the course web page (<http://people.math.gatech.edu/~swiech/4581-hw-book.html>). Other problems will be posted there too. They will not be collected. These problems should help you determine what part of the material you have mastered and what you still need to work on. However, they will not constitute a complete set of exercises sufficient for getting an A in the course. A separate homework assignment will be given which will be collected.

GRADING: There will be three tests (September 21, October 24, and November 16), one homework assignment (due on November 19), and the final exam. Each test will count for 15% of the final grade, the homework assignment for 20%, and

the final exam for 35%. There will be no extra credit opportunities. Your grade will be based on how well you can solve problems and compute using the theory. You will not be asked to reproduce proofs. To get an A, respectively B, C, and D, your final score will have to be greater than 85%, respectively 70%, 55%, and 40%. Computers, calculators and mobile devices will not be allowed during the tests and the final exam.

**ONLINE STUDENTS:** Students taking the course online will need a physical proctor for the tests and the final exam. The students will be allowed 3-day delay for the exams and the homework. The graded exams and the homework will be returned to them via T-Square. The best way to communicate with me is by e-mail.

**ACADEMIC INTEGRITY:** Please be aware of the Georgia Tech Honor Code and follow it carefully. In particular please make sure that all the work you submit is your own. The Georgia Tech Honor Code can be found at <http://www.policylibrary.gatech.edu/student-affairs/code-conduct>.

**ACCOMODATIONS FOR STUDENTS WITH DISABILITIES:** If you are a student with learning needs that require special accommodation, contact the Office of Disability Services at (404)894-2563 or <http://disabilityservices.gatech.edu/>, as soon as possible, to discuss your special needs. Please also e-mail me as in order to set up a time to discuss your learning needs.

**ATTENDANCE:** Attendance in class is not required, however I encourage everybody to come to class as I will be expanding on the material available in the textbook.

**COLLABORATION:** I encourage the students to learn together and exchange ideas, including ideas about homework problems. However all the work submitted by you for grading must be your own.

**LATE ASSIGNMENTS AND RE-SCHEDULED/MISSED EXAMS:** Late homework will not be accepted. Make-up exams can be given if the exam was missed because of institute approved activities, illness, etc. (see <http://www.catalog.gatech.edu/rules/4>).

#### **CAMPUS RESOURCES FOR STUDENTS:**

Academic support:

Center for Academic Success <http://success.gatech.edu>

Residence Life's Learning Assistance Program <https://housing.gatech.edu/learning-assistance-program>

OMED: Educational Services (<http://omed.gatech.edu/programs/academic-support>)

Communication Center (<http://www.communicationcenter.gatech.edu>)

Academic advisors for your major <http://advising.gatech.edu/>

## PERSONAL SUPPORT:

Georgia Tech Resources:

The Office of the Dean of Students: <http://studentlife.gatech.edu/content/services>; 404-894-6367; Smithgall Student Services Building 2nd floor

Counseling Center: <http://counseling.gatech.edu>; 404-894-2575; Smithgall Student Services Building 2nd floor

Students Temporary Assistance and Resources (STAR): <http://studentlife.gatech.edu/content/need-help>

Stamps Health Services: <https://health.gatech.edu>; 404-894-1420

OMED: Educational Services: <http://www.omed.gatech.edu>

Womens Resource Center: <http://www.womenscenter.gatech.edu>; 404-385-0230

LGBTQIA Resource Center: <http://lgbtqia.gatech.edu/>; 404-385-2679

Veterans Resource Center: <http://veterans.gatech.edu/>; 404-385-2067

Georgia Tech Police: 404-894-2500