AMATH 569
ADVANCED METHODS FOR
PARTIAL DIFFERENTIAL EQUATIONS
SPRING 2024

INSTRUCTOR

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Office Hours	M, W, F	3:00 pm–4:00 pm

MEETING TIMES

M, W, F	1:30–2:20 pm	Mary Gates Hall 271

COURSE WEB PAGE

http://faculty.washington.edu/mkot/courses/569-spring-2024

COURSE TEXT:

This course does not have a required textbook, but please see the last section for helpful references. I will also provide typed lecture notes for all of the major course topics.

COURSE CONTENT:

Amath 569 is a course on advanced, analytical methods for partial differential equations. Topics include the method of characteristics, conservation laws, and shocks; the classification of second-order equations; transform methods, and Green functions for PDEs.

PREREQUISITES:

Amath 569 is a second, advanced course in PDEs. You should have had previous exposure to ODEs and PDEs. I will definitely use complex-variables techniques. So please make sure that you have had a course in complex variables.

HOMEWORK:

Homeworks are due one week from the date of assignment. Homeworks will be collected in class. Alternatively, put your homework in my campus mail box (in Lewis 202A) by 3:00 pm of the due date. Homeworks constitute 65% of the course grade. Write up your homework alone, not as a group !

EXAMS

A take-home exam accounts for 35% of your grade. The exam will be available on Wednesday, May 22, 2024. It will be due Friday, May 31, 2024 at 2:30 pm.

IMPORTANT DATES:

Monday	March 25	First Day of Classes
Wednesday	May 22	Take-home Exam Available
Monday	May 27	Memorial Day (No Class)
Friday	May 31	Last Day of Lectures
Friday	May 31	Take-Home Exam Due (at 2:30 pm)
Friday	March 8	Last Day of Lectures

USEFUL BOOKS AND REFERENCES:

Andrews, L. C. and Shivamoggi, B. K. 1988. *Integral Transforms for Engineers and Applied Mathematicians.* Macmillan Publishing Company, New York.

Antimirov, M. Y., Kolyshkin, A. A., Vaillancourt, R. 1993. *Applied Integral Transforms.* American Mathematical Society, Providence.

Chester, C. R. 1971. *Techniques in Partial Differential Equations.* McGraw-Hill, New York.

Debnath, L. 2012. *Nonlinear Partial Differential Equations for Scientists and Engineers.* Birkhauser, New York.

Debnath, L. and Bhatta, D. 2015. *Integral Transforms and Their Applications.* Chapman & Hall/CRC, Boca Raton.

Garabedian, P. R. 1998. *Partial Differential Equations.* American Mathematical Society, Providence

Greenberg, M. D. 1971. *Application of Green's Functions in Science and Engineering.* Prentice-Hall, Englewood Cliffs.

Haberman, R. 2019. *Applied Partial Differential Equations with Fourier Series and Boundary Value Problems.* Pearson, Boston

Hattori, H. 2019. *Partial Differential Equations: Methods, Applications and Theories.* World Scientific, Singapore.

Jerri, A. J. 1992. *Integral and Discrete Transforms with Applications and Error Analysis.* Marcel Dekker, New York.

Kevorkian, J. 2000. *Partial Differential Equations: Analytical Solution Techniques.* Springer, New York.

Kythe, P. K. 2011. *Green's Functions and Linear Differential Equations: Theory, Applications, and Computation.* CRC Press, Boca Raton.

Myint-U, T. and Debnath, L. 2007. *Linear Partial Differential Equations for Scientists and Engineers.* Birkhauser, Boston.

Sano, O. 2023. *Partial Differential Equations.* World Scientific, Singapore.

Sneddon, I. H. 1972. *The Use of Integral Transforms.* McGraw-Hill, New York.

Stakgold 1967 *Boundary Value Problems of Mathematical Physics. Volume 1.* MacMillan, New York.

Stakgold (1968. *Boundary Value Problems of Mathematical Physics. Volume 2.* MacMillan, New York

Williams, W. E. 1980. *Partial Differential Equations.* Oxford University Press, Oxford.

Zauderer, E. 2006. *Partial Differential Equations of Applied Mathematics.* John Wiley & Sons, Hoboken.