PHYS 752 **Mathematical Methods in Physics I** **Spring 2018**

Course # 14080 (3 credits)

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Classes: Tuesday & Thursday, 3:30-4:45 p.m., South Eng. 221 **Office hours:** Drop in any time. South Eng. 214B

Description: This introductory graduate-level course reviews practical mathematical methods routinely used by physicists and applications to a variety of physical problems. The focus is on differential equations and variational principles. Depending on interests, other topics may be discussed. See the course outline for a preliminary list of topics.

Goal: Develop conceptual understanding and practical expertise in applying advanced mathematical techniques to a variety of physics- and engineering-related problems.

Student Responsibilities: Attend all classes. Read assigned material in advance. Come prepared for discussion. Be curious; ask questions. Complete assignments on time.

Recommended Textbook: K. F. Riley, M. P. Hobson, and S. J. Bence, *Mathematical Methods for Physics and Engineering*, 3rd edition (Cambridge, 2006).

Evaluation:				
	Homework (8)	70 pts	(best 7)	See attached schedule
	Exams (3)	120 pts	(best 2)	Feb. 22, April 10, May 10
	Quizzes/Writing	10 pts		
	Total	200 pts		

No makeup exams will be scheduled, but your lowest of three exam scores will be dropped. Class attendance is expected. More than three unexcused absences may result in failure.

Homework: Assignments will be posted on Blackboard (`https://bb.ndsu.nodak.edu`). While discussion of homework with classmates is encouraged, submitted work must be your own. Similarity to other students' or internet solutions will result in zero points. Late homework will be assessed a 50% penalty/day.

Grading: A: 90-100%, B: 80-89.9%, C: 70-79.9%, D: 60-69.9%, F: $< 60\%$

I reserve the right to shift grade boundaries, but any shift will work only in your favor.

The academic community is operated on the basis of honesty, integrity, and fair play. NDSU Policy 335: Code of Academic Responsibility and Conduct applies to cases in which cheating, plagiarism, or other academic misconduct have occurred in an instructional context. Students found guilty of academic misconduct are subject to penalties, up to and possibly including suspension and/or expulsion. Student academic misconduct records are maintained by the Office of Registration and Records. Informational resources about academic honesty for students and instructional staff members can be found at `www.ndsu.edu/academichonesty`.

All access to NDSU computers must respect NDSU Senate Policy, section 158: Acceptable use of Electronic Communication Devices `http://www.ndsu.nodak.edu/policy/158.htm`

Any students with disabilities or other special needs, who need special accommodations in this course are invited to share concerns or requests with the instructor and to contact the Disability Services Office as soon as possible.

Preliminary Schedule

Dates	**Topic(s)**	**Chapter(s)**
Jan. 9-11	Vector Calculus	10
Jan. 16-18	Vector Calculus; Line, Surface, and Volume Integrals	10, 11
Jan. 23-25	Vector Calculus; Line, Surface, and Volume Integrals	11
Jan. 30-Feb. 1	Fourier Series and Integral Transforms	12, 13
Feb. 6-8	Integral Transforms; Ordinary Differential Equations (ODEs)	13, 14
Feb. 13-15	Ordinary Differential Equations (ODEs)	14, 15
Feb. 22	**Midterm Exam 1**	**10–13**
Feb. 27-March 1	Series Solutions of ODEs	16
March 5-9	APS March Meeting (no classes)	
March 12-16	Spring Break (no classes)	
March 20-22	Eigenfunction Methods for Differential Equations	17
March 27-29	Partial Differential Equations (PDEs)	20
April 3-5	PDEs: Separation of Variables, Green Functions	21
April 10	**Midterm Exam 2**	**14–17**
April 17	Calculus of Variations	22
April 19	Calculus of Variations and Applications	22
April 24	Integral Equations and Applications	23
April 26	Tensors and Applications	26
May 1-3	Tensors and Applications	26
May 10	**Final Exam: 3:30-5:30 p.m.**	**20–26**

Homework Schedule

Homework	**Date Assigned/Date Due**	**Chapters**
1	Jan. 9/Jan. 23	10
2	Jan. 23/Feb. 1	11, 12
3	Feb. 1/Feb. 13	12, 13
4	Feb. 13/March 1	14, 15
5	March 1/20	16, 17
6	March 20/April 3	20, 21
7	April 3/April 17	21, 22
8	April 17/May 1	23, 26