

PHY 7110

Methods of Theoretical Physics 2

Fall 2017

Sean Gavin

office: Room 320 Physics Research Bldg.
phone: 313-577-0156
email: sean@physics.wayne.edu

TEXT: *Mathematical Methods for Physics*, by H.W. Wyld, 2nd Edition, ISBN-10: 0738201251, ISBN-13: 978-0738201252
Mathematics for Physics, M. Stone and P. Goldbart, ISBN-10: 0521854032, ISBN-13: 978-0521854030
Schaum's Mathematical Handbook of Formulas and Tables, 4th Edition, ISBN-10: 0071795375, ISBN-13: 978-0071795371

SUPPLEMENTS: Lower level: *Mathematical Methods in the Physical Sciences*, Boas
Encyclopedic: *Mathematical Methods for Physics and Engineering: a Comprehensive Guide*, by Riley, Hobson and Bence; *Mathematical Methods*, Arfken

OFFICE HOURS: after class

HOMEWORK: Every 1-2 weeks. **Late homework will not be accepted.** The lowest homework will be dropped.

GRADES: There will be two midterm exams and one final. **Dates of the exams may change if the class departs from the expected schedule. Changes will be announced in class.**

Homework	40%
Midterm Exams	40%
Final Exam	20%

FINAL EXAM: **Monday, December 18, 2017, 8:00a.m. – 10:00a.m**

COURSE CONTENT:

- Partial differential equations: Poisson, diffusion, wave, fluid mechanics
- Separation of variables, ordinary differential equations, eigenfunctions, orthogonality, Sturm-Liouville Theory
- Legendre polynomials, Bessel functions, and other special functions
- Boundary value problems with spherical and cylindrical symmetry
- Initial value problems, normal modes, Green functions
- Complex variables and contour integration
- Fluid motion, the mathematics of real waves

LEARNING OUTCOMES: After taking this course, you will:

- Be familiar with the techniques used in solving the classic partial differential equations of mathematical physics, including Sturm-Liouville theory, special functions, and contour integration and other complex analysis methods.
- Understand how mathematics shapes the solutions to problems in fluid mechanics, electromagnetic theory, and other disciplines.
- Be able to formulate problems and apply techniques across disciplines.