DALHOUSIE UNIVERSITY

Faculty of Science Course Syllabus
Department of Mathematics and Statistics

Topics in Mathematical Physics
MATH4165/PHYC4160/MATH5165/PHYC5160
FALL 2017

Instructor(s): *Roman Smirnov* *Roman.Smirnov@dal.ca* *Chase324*

Lectures: *Monday & Wednesday 8:35am – 9:55am* *Chase319*

Laboratories: *N/A*

Tutorials: *N/A*

Submit course syllabus to your Department office for posting on the Dept website prior to the start of term
Submit requests for final exam exemptions (1000, 2000 and 3000 level courses only) to the Dean's office at least 2 weeks prior to the start of term

Course Description

Topics discussed include: complex variable theory, Fourier and Laplace transform techniques, special functions, partial differential equations.

Course Prerequisites

MATH 3120.03, PHYC 2140.03 or permission of instructor.

Course Objectives/Learning Outcomes

Knowledge of the math techniques and methods (such as the tools from complex analysis, integral transforms, special functions, etc) that can be used to study the partial differential equations underlying various models in applied mathematics, physics, engineering, and so on.

Course Materials

Recommended textbook: ''Mathematical Methods for Physics and Engineering" by K. F. Riley, M. P. Hobson and S. J. Bence, 3rd Edition, Cambridge University Press. Three copies of the textbook along with three student solutions manuals have been put on reserves at the Killam Library.

Course Assessment

Bi-weekly assignments (the first of which is due on September 27 and then every two weeks thereafter, midterm (November 1), the final exam will be scheduled by the Registrar Office.

NOTE: *An exemption is required for 1000 to 3000 level courses if you are not planning to hold a final exam scheduled by the Registrar's Office. Submit your syllabus along with your request (**and reason for the request**) to the Assistant Dean (scieasst@dal.ca) at least 2 weeks prior to the start of classes.*

Component	Weight (% of final grade)	Date

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Final exam *50%* *(Scheduled by Registrar)*

Assignments *(4, or 5) every two weeks, 30%*

Midterm *20% (November 1)*

Other course requirements

The graduate students will be required to do research projects, which will account for 10% of the final mark. See the instructor for more details.

Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale

A+ (90-100)	B+ (77-79)	C+ (65-69)	D (50-54)
A (85-89)	B (73-76)	C (60-64)	F (<50)
A- (80-84)	B- (70-72)	C- (55-59)	

Course Policies

Late homework will not be accepted except with the instructor's prior permission.

A missed midterm cannot be written at another time. If you miss the midterm without prior permission, then it will count as a 0. Exceptions are made in two cases: (1) if you obtain the instructor's prior permission to miss a midterm, or (2) if you have an officially valid excuse such as a medical doctor's note. In these cases, the weight of the missed midterm will be shifted to the final exam (e.g., the final exam will then count 70% instead of 50%). There is no make-up option for the final exam except in cases of an officially valid excuse such as a medical doctor's note.

The students are expected to work on the assignments individually.

Course Content

Complex numbers
Analytic functions
The Cauchy-Riemann relations
Elementary functions
Conformal transformations
Complex integrals
Power series in a complex variable
Cauchy's theorem
Cauchy's integral formula
Taylor and Laurent series
Residue theorem
Definite integrals using contour integrals
Fourier transforms
Laplace transforms
Inverse Laplace transform using complex variables
The gamma and beta functions
Bessel functions
Legendre functions

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Important partial differential equations (PDFs)
Classification of linear second order PDFs
General forms of a solution
Uniqueness
Separation of variables
Complex potentials