3090 - Methods in theoretical physics (Fall 2018)

Course instructor: Dr. Sean Tulin

Outline: This class will be a smorgasbord of different mathematical tools and concepts that are essential for the study of advanced topics in physics. The course will be broken in three units:

- Complex analysis: complex variables, residue theory
- Integral transforms: Fourier series and Fourier transforms, Laplace transforms, and Green's functions
- Vector spaces, eigenvalue problems, and group theory

Course text: There is no required text. *Mathematical Methods for Physicists* by Arfken, Weber, & Harris is useful reference for your shelf, but it is not pedagogical and we will not be following it closely.

Grading and tests: There will be weekly homework assignments, weekly in-class assignments, two midterm tests, and a final exam. Your final grade will be based as follows:

- Homework: Your homework grade (averaged over all assignments) counts 25%.
- In-class assignments: Your lowest three grades will be dropped and the average of the remaining assignments counts 15%.
- Midterms: Each midterm (two in total) counts 15%. Tentatively scheduled for **Monday Oct 15th** and **Monday November 12th**.
- Final exam: 30%.

Homework policy: Homework problems are the most essential part of this class. Here are the rules:

- Assignments will be posted on Wednesdays and will be due on the following **Wednesdays before 4pm**. You may turn in your assignments during class or at my office. If I am not present in my office, slip it under my door. No emailed copies are accepted.
- Extensions: None will be given unless there is an emergency or other extreme circumstance. Late homework must be turned in during working hours and will be penalized 10% per 24 hours (this includes weekends too).
- Expectations: All homework you turn in will be entirely your own work. You may discuss homework problems with your peers, but you must write your own solutions independently.
- Homework solutions will be made available during class. No electronic copies of solutions will be provided.

In-class assignments: Every Monday during class, we will have group work exercises.

- I will provide a problem sheet in class. These problems are not meant to be exceptionally hard and will give you a chance to practice what is being taught in the lecture.

- Problems will be solved in groups. Your group will write up a single set of solutions.
- Everyone in the group will receive one common grade.
- There are no make-ups for any reason. If you happen to be absent for any reason, this will count as one of your dropped grades.

Email policy: I try to respond to email questions as soon as I can. However, please obey the following guidelines:

- Do **not** email me to request your grade on any assignment or in the course as a whole.
- **Please** email me if I forget to upload any course materials in a timely manner.
- **Please** email me if you find a mistake in any course materials.

Late policy:

- You may not arrive more than 5 minutes late to class.

Other information:

- Instructor email: stulin@yorku.ca
- Instructor office: Petrie 217
- Office hours: Mondays 2–3pm or by appointment.
- Course website: http://www.yorku.ca/stulin/3090