Course outline for Physics 113: Mathematical Physics III

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I. COURSE INFORMATION

Description: Mathematical methods for physicists III. Differential and integral equations. Functional calculus and stochastic variables.

Web: `sand.nip.upd.edu.ph/physics113`

References: Arfken 5$^{\text{th}}$ (AR), Cohen-Tannoudji (CJ).

Prerequisite: Physics 112.

Credits: 3.0

Section: WFQ (WF 7:00–8:30 AM).

Location: F105

II. CLASS POLICIES

Attendance: University Rules state that students that accumulate six or more absences may be given a failing grade (5.0) if they do not drop the course.

Quizzes: Quizzes will be given to check attendance.

Long Exams: There will be three long examinations of equal weights. These exams constitute 3/4 of the final grade. One make up exam replaces an exam missed due to an excused absence. Further missed exams and unexcused missed exams will be given a grade of zero. Absences must be documented and justified as excused within one week of the student's return to class.

Raw score x	**Point grade**
$90\% \leq x \leq 100\%$	1.00
$85\% \leq x < 90\%$	1.25
$80\% \leq x < 85\%$	1.50
$75\% \leq x < 80\%$	1.75
$70\% \leq x < 75\%$	2.00
$65\% \leq x < 70\%$	2.25
$60\% \leq x < 65\%$	2.50
$55\% \leq x < 60\%$	2.75
$50\% \leq x < 55\%$	3.00
$45\% \leq x < 50\%$	4.00
$x < 45\%$	5.00

Problem Sets: Problem sets and quizzes make up the remaining 1/4 of the final grade. Late sets will not be given any credit. Solutions to all problem sets must be submitted: a grade of INC will be given if any problem set is not turned in.

Academic honesty: Any form of cheating in examinations or any act of dishonesty in relation to studies, such as plagiarism, shall be subject to disciplinary action.

III. EXAM SCHEDULES

First day of classes : F 02 Aug 2019.
First LE : F 20 Sep 2019.
Second LE : F 25 Oct 2019.
Third LE : F 29 Nov 2019.
Last day of classes : T 03 Dec 2019.

IV. LECTURE PLAN

0. Administrative. Linear vector spaces. [AR 9.4]
1. PDEs and separation of variables. [AR 8.1, 8.3]
2. Green's functions 1. Conducting sphere in a constant electric field. Multipole expansion. [AR 12.6, 8.7]
3. Green's functions 2. Uniformly charged sphere. Born approximation. [AR 8.7]
4. Sturm–Liouville theory [AR 9]
5. Fourier series. [AR 14.1–14.4]
6. Discrete Fourier transforms. [AR 14.6]
7. Fourier transforms. [AR 15.1–15.5]
8. Fourier transform pairs. Laplace transforms 1. [AR 15.6, 15.8–15.9]
9. Laplace transforms 2. Convolutions. Bromwich integral. [AR 15.10–15.12]

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10. Integral equations 1. Definitions and integral transformations. [AR 16.1–16.2]

11. Integral equations 2. Neumann series and separable kernels. [AR 16.3]

12. Integral equations 3. Hilbert–Schmidt theory. [AR 16.4]

13. Variational calculus. [AR 17.1–17.5]

14. Lagrange multipliers. [AR 17.6]

15. Variations with constraints. [AR 17.7]

16. Probability [AR6 19.1].

17. Random variables and probability densities [AR6 19.2].