

## The Hebrew University of Jerusalem

Syllabus

## Equations of Mathematical Physics - 77313

Last update 03-08-2023

<u>HU Credits:</u> 6

Degree/Cycle: 1st degree (Bachelor)

Responsible Department: Physics

<u>Academic year:</u> 0

<u>Semester:</u> 1st Semester

<u>Teaching Languages:</u> Hebrew

<u>Campus:</u> E. Safra

<u>Course/Module Coordinator:</u> Prof. Michael Assaf

Coordinator Email: michael.assaf@mail.huji.ac.il

<u>Coordinator Office Hours:</u> will be set in the first week of class

Teaching Staff:

Prof Michael Assaf, Mr. Elyasaf Cohen, Mr. Binyamin Vilk

<u>Course/Module description:</u> Methods of Mathematical Physics

## Course/Module aims:

To teach the students advanced mathematical methods which are extensively used in physics and other sciences

Learning outcomes - On successful completion of this module, students should be able to:

master advanced mathematical methods which will help them in physics courses

Attendance requirements(%):

0

*Teaching arrangement and method of instruction: lectures, recitations by teaching assistants and home assignements* 

## Course/Module Content:

Vector analysis in curvilinear coordinates. An introduction to generalized functions. The boundary value problem and the Sturm-Liouville theory. The Green function. Partial differential equations (PDEs) of first order: the method of characteristics. PDEs of the second order: classification and canonical forms. Cauchy, Dirichlet and Neumann problems. The wave equation: the d'Alembert's formula, vibrating string, vibrating membrane. The heat equation. The Laplace equation. Inhomogeneous problems. An intro to variational calculus. An intro to integral equations.

<u>Required Reading:</u> None Additional Reading Material:

1. G.B. Arfken. Mathematical Methods for Physicists. 2. K.F. Riley, M.P. Hobson, and S.J. Bence. Mathematical Methods for Physics and Engineering.

3. J. Mathews and R.L. Walker. Mathematical Methods of Physics.

4. M.L. Boas. Mathematical Methods in the Physical Sciences.

<u>Grading Scheme:</u> Written / Oral / Practical Exam 90 % Submission assignments during the semester: Exercises / Essays / Audits / Reports / Forum / Simulation / others 10 %

Additional information: