

The Hebrew University of Jerusalem

Syllabus

DIFFERENTIAL EQUATIONS - 80320

Last update 29-08-2024

HU Credits: 4

Degree/Cycle: 1st degree (Bachelor)

Responsible Department: Mathematics

<u>Academic year:</u> 0

Semester: 2nd Semester

<u>Teaching Languages:</u> Hebrew

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

<u>Course/Module Coordinator:</u> Jonathan Breuer

<u>Coordinator Email: jonathan.breuer@mail.huji.ac.il</u>

<u>Coordinator Office Hours:</u> Mondays, 15:00--16:00, Ross 80

Teaching Staff:

Prof. Jonathan Breuer, Mr. Daniel Ofner

Course/Module description:

The course will be concerned with the general theory of ordinary differential equations (existence, uniqueness, domain of definition, dependence on initial conditions, linear equations), with first order partial differential equations and with the prototypes of partial differential equations of second order. More topics will be discussed as time allows.

<u>Course/Module aims:</u>

Same as in learning outcomes.

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

Ability to prove and apply the theorems presented in the course.

Ability to apply correctly the mathematical methodology in the context of the course.

Acquiring the fundamentals as well as basic familiarity with the field which will assist in the understanding of advanced subjects.

Ability to understand and explain the subjects taught in the course.

Attendance requirements(%):

0

Teaching arrangement and method of instruction: Lecture + exercise

Course/Module Content:

Solvable differential equations of the first order. Existence and uniqueness theorems. Estimation of maximal domain definition. Dependence in initial conditions. Systems of differential equations and high order equations. Systems of linear ordinary differential equations of the first order and linear equations of high order. Stability and the stable manifold theorem.

Sturm-Liouville systems.

The method of characteristics, Laplace equation, the heat equation and the wave equation. Other or additional topics may be studied.

<u>Required Reading:</u> none

Additional Reading Material:

1) Ordinary differential equations - Lecture notes by Simon Brendle.

2) Ordinary differential equation and dynamical systems - Gerald Teschl.

3) Partial differential equations - Lawrence Evans.

4) Partial differential equations - Andras Vasy.

5) Elliptic partial differential equations of second order - Gilbarg and Trudinger

Additional books:

2007 (בק) פישלוב, א. פרחי, משוואות דיפרנציאליות רגילות, תיאוריה ותרגילים, (בק) (תרגום מאנגלית) פישלום (תרגום מאנגלית) "סוברת של האוניברסיטה הפתוחה, כרכים 1,2,3,4 "מבוא למשוואות דיפרנציאליות), החוברת של האוניברסיטה הפתוחה, כרכים

Grading Scheme:

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

<u>Additional information:</u> Other or additional topics may be studied.