האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM

The Hebrew University of Jerusalem

Syllabus

INFINITESIMAL CALCULUS (2) - 80132

Last update 21-03-2024

HU Credits: *7*

Degree/Cycle: *1st degree (Bachelor)*

Responsible Department: *Mathematics*

Academic year: *0*

Semester: *1st and/or 2nd Semester*

Teaching Languages: *Hebrew*

Campus: *E. Safra*

Course/Module Coordinator: *Dan Mangoubi*

Coordinator Email: *dan.mangoubi@mail.huji.ac.il ; godin@math.huji.ac.il*

Coordinator Office Hours:

Teaching Staff:

Dr. Yves Godin,
Mr. Or Kuperman,
Mr. Kapota Asaf,
Prof Dan Mangoubi,
Mr. Massalhah Sobhi

Course/Module description:

1) Derivatives:
Definition, derivation rules. Fermat-Rolle-Lagrange-Cauchy theorems.
Application to study of functions: monotonicity, extremal points, convexity (Jensen inequality). Extremum problems.
Taylor polynomial, Taylor remainder, Taylor Theorems: Lagrange form of the remainder, asymptotics of the remainder.
L'Hopital's rule.
2) Integral: Riemann's sums, Riemann's integral, improper integral.
(Uniform continuity),
Fundamental Theorem,
Integration by parts,
Integration of rational functions, trigonometric functions and rational functions of trigonometric functions.
Taylor remainder in integral form. Integral mean value theorem.
Improper integral: in a bounded or unbounded segement, conditional convergence vs. absolute convergence, Gamma function.
3) Series: Positive series, alternating series, general series, convergence tests. permutations.

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The material below will be skipped this semester:
4) sequences and series of functions.
5) power series.

Course/Module aims:

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 understanding and explain the subjects taught in the course.

Attendance requirements(%):
0

Teaching arrangement and method of instruction: Lecture + exercise

Course/Module Content:
1) Derivation
2) Integration
3) sequences and series of functions.

The material below will be skipped
this semester (2024A)
4) Sequences and series of functions.
5) Power series.

Required Reading:
None

Additional Reading Material:
1.. מייזלר, "חשבון אינפיניטסימלי"
2. Rudin, principles of mathematical analysis
3. Courant and John, Introduction to Calculus and Analysis I
4. Spivak, Calculus
5. הוכמן, חשבון אינפיניטסימלי.

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

Additional information: