האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM

The Hebrew University of Jerusalem

Syllabus

MATHEMATICS FOR SCIENCE STUDENTS 1 - 80125

Last update 15-10-2018

HU Credits: 4

Degree/Cycle: 1st degree (Bachelor)

Responsible Department: Mathematics

Academic year: 0

Semester: 1st Semester

Teaching Languages: Hebrew

Campus: E. Safra

Course/Module Coordinator: prof. Y. Itin

Coordinator Email: itin@math.huji.ac.il

Coordinator Office Hours: Sundays, 12-13 am

Teaching Staff:

Mr. Shmuel Berger
Mr. Bar-Yoda Avigdor
Mr. Ohana Barak
Mr. Livne Gil

Course/Module description:
Differenciation, integration and applications.

Population dynamics models.

Course/Module aims:
To obtain ability to calculate derivatives and integrals and use them for various purposes.

Learning outcomes - On successful completion of this module, students should be able to:
Calculate derivatives and integrals.

Draw graphs of functions.

Expand functions in Taylor series.

Calculate various approximations.

Solve seperable differntial equations.

Investigate population dynamics models.

Attendance requirements(%):
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Teaching arrangement and method of instruction: Lecture and exercise.

Course/Module Content:
- The real line: Natural, whole ,rational and real numbers. Absolute value. Distances on the line. Domains on the line.

- The elementary functions: Power functions. Exponential and trigonometric functions. The absolute value function.

- The inverse function. Root functions. Logarithmic and inverse trigonometric functions.

- Polynomials and rational functions.

- Limits and one sided limits of functions. Basic limit theorems.

- Continuity. Basic continuity theorems. The mean value theorem and the theorem of Weierstrass.

- The derivative. High order derivatives. The tangent. Basic derivative theorems.

- The theoretical basis of curve plotting: The theorems of Fermat And Rolle, the mean value theorem and L'Hopital's rule.

- Curve plotting: Intervals of increase and decrease. Minimum and maximum points. Intervals of convexity and concavity. Inflection points. Vertical and non-vertical asymptotes.

The integral. The primitive function. Indefinite integral. - Integration by parts. Integration by substitution. Integration of rational functions. Definite integral. The integral as a function of its upper limit. Area computation. Improper integrals.

Geometric and physical meanings of the derivative and the integral.-

Infinite series. Maclauren and Taylor series. Approximations. -

- Differential equations. First order seperable equations.

Investigation of population dynamics models(one species): Exponential growth.- Restricted growth. Logistic growth. Critical threshold. Logistic Growth with critical threshold.

Required Reading:
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Additional Reading Material:
Howard Anton: Calculus. John Wiley. -

Beni Goren: Differential and integral calaulus, 4 and 5 units (Hebrew).-

Frank Ayres: Calculus. Shaum series. -

Murray Spiegel: Advanced calculus. Shaum series. -

Course/Module evaluation:
End of year written/oral examination 70 %
Presentation 0 %
Participation in Tutorials 0 %
Project work 0 %
Assignments 15 %
Reports 0 %
Research project 0 %
Quizzes 15 %
Other 0 %

Additional information:
None