The Hebrew University of Jerusalem

Syllabus

NUMERICAL METHODS - 71980

Last update 25-01-2015

<u>HU Credits:</u> 3

<u>Degree/Cycle:</u> 2nd degree (Master)

<u>Responsible Department:</u> Agricultural Economics

<u>Academic year:</u> 1

<u>Semester:</u> 2nd Semester

<u>Teaching Languages:</u> Hebrew

<u>Campus:</u> Rehovot

<u>Course/Module Coordinator:</u> J. Rivlin

<u>Coordinator Email:</u> Judith.Rivlin@mail.huji.ac.il

<u>Coordinator Office Hours:</u> Sunday 14:15-15:00

<u>Teaching Staff:</u>

Dr. Judith Rivlin

Course/Module description:
  Numerical Solution of Nonlinear Equations; Interpolation; Splines ; Numerical Solution of Linear Equations; Eigenvalues and Eigenvectors. Numerical Differentiation and Integration.

Course/Module aims:
  To introduce the difference between an analytical and a numerical solution of a problem. To present principal methods to solve numerically classical problems in calculus such as: Solution of a nonlinear equation, Approximation of a function by a piecewise polynom , Solution of a linear system of equations . Calculation of derivatives and integrals numerically

Learning outcomes - On successful completion of this module, students should be able to:
  To solve numerically a nonlinear equation. To approximate a function by a piecewise polynom , To solve a linear system of equations . To Calculate derivatives and integrals numerically

Attendance requirements(%):
  100

Teaching arrangement and method of instruction: Lecture and exercises

Course/Module Content:
  Solution of a nonlinear equation: The Bisection, Newton, Secant and Fixed Point methods.
Interpolation: The interpolation formulas of Lagrange, Hermite and Newton. Splines.
Solution of a linear system of equations: Gaussian Elimination method, Pivoting methods. Iterative methods: Jacobi, Gauss-Seidel, S.O.R. Stabity of a matrix. Eigenvalues and Eigenvectors.
Numerical Differentiation. Stability.
Numerical Integration: Newton Cotes, Gauss.

Required Reading:
 Lecture summaries;
Numeric methods- Rivlin, J.-
Rehovot 2015

 Additional Reading Material:
  Burden & Faires- Numerical Analysis-7th edition (2001).

 Course/Module evaluation:
 End of year written/oral examination 90 %
 Presentation 0 %
 Participation in Tutorials 0 %
 Project work 0 %
 Assignments 10 %
 Reports 0 %
 Research project 0 %
 Quizzes 0 %
 Other 0 %

Additional information:
  _The course is useful for anyone who solves problems with a computer. We will
learn basic methods for solving various mathematical problems, including: non-
linear equation solving, approximation of functions with polynomials, solving
systems of linear equations and so on ..._
_The software used in the course is a software Maple. At same time there will be the
option to work with the software MATHEMATICA or MATLAB for those who are
interested._