QFO-AP-FI-MO02	Course Syllabus :اسم النموذج	جامعة فيلادلفيا Philadelphia University
رقم الاصدار : 1 (Revision)	الجهة المصدرة: كلية تكنولوجيا المعلومات	
التاريخ :2017/11/05	الجهة المدققة: عمادة التطوير والجودة	
عدد صفحات النموذج:		

Course Title: Numerical analysis	**Course code: 750272**
Course Level: 2	**Course prerequisite(s) and/or corequisite(s): 250101 + 750114**
Lecture Time	**Credit hours: 3**

Academic Staff Specifics

Name	Rank	Office Number and Location	Office Hours	E-mail Address

Course Description:
Numerical analysis involves the design, analysis, and implementation of approximation methods for various problems. This module introduces the concepts of numerical analysis starting with the Mathematical Preliminaries then presenting the Solution of Equations in One Variable, Interpolation and Polynomial Approximation, Direct Methods of Solving Linear Systems of Equations, Iterative Methods for Solving Linear Systems of Equations, The Iterative Methods for Solving Nonlinear Systems of Equations and the Curve Fittings.

Course Objectives:
The main goal of the module is to give students a clear understanding and deep knowledge how the typical of "real life" mathematical, physical, or engineering problems are to be solved in the modern setting. As opposed to tendency in lower-level mathematical courses to teach recipes for "exact" solving particular problems fitting into very special form, this module provides the idea of approximate solving wide variety of applied standard problems on a computer by numerical methods.

Course Components
- Mathematical Preliminaries: Computer arithmetic, round-off error, source of errors
- Solution of equations in one variable: Bisection method, fixed point method, false position method, Secant method, Newton-Raphson method, Interpolation and polynomial approximation
- Introduction to interpolation

- Direct methods for solving linear systems of equations
- Iterative methods for solving linear systems
- Iterative methods for solving nonlinear systems
- Curve fitting techniques

Text book:

Richard L. Johnson and Douglas J. Faires, Numerical Analysis, 9th Edition, Brooks/ Cole 2010..

In addition to the above, the students will be provided with handouts by the lecturer.

Teaching Methods:

Duration: 16 weeks in first semester, 48 hours in total
Lectures: 32 hours, 2 per week
Tutorial: 16, 1 per week.
Laboratories: 5 hours in total, 1hour per three weeks.

Learning Outcomes:

A- Knowledge and understanding

A1-Understand how numerical methods presented in the course work for solving various standard mathematical problems in realistic settings.

A2-Select the appropriate algorithm to solve the problem based on criterion of its suitability for present-day computers

B- Intellectual Skills.

B1-Interpret correctly machine output and provide a good understanding of the problems of error analysis and convergence of algorithms.

C- Practical skills.

C5-Apply effectively numerical algorithms presented in the course based on ready-to-use computer programs and understand issues of algorithms complexity and programmability.

Learning Outcomes Achievement

- **Development: A1and B1are developed through the lectures.**
  A2 is developed through tutorials and home works
  C5 is developed through tutorials and lab sessions

- **Assessment: A1, A2and B1 are assessed by quizzes and written exams, while C5 is assessed by assignments and labs work.**

Assessment Instruments

Allocation of Marks	
Assessment Instruments	**Mark**

First examination	**20%**
Second examination	**20%**
Final Exam (written unseen exam)	**40%**
Reports, Assignments, Quizzes, Home works	**20%**
Total	**100%**

** Make-up exams will be offered for valid reasons only with consent of the Dean. Make-up exams may be different from regular exams in content and format.*

Practical Submissions
The assignments that have work to be assessed will be given to the students in separate documents including the due date and appropriate reading material.

Documentation and Academic Honesty
Submit your home work covered with a sheet containing your name, number, course title and number, and type and number of the home work (e.g. tutorial, assignment, and project).

Any completed homework must be handed in to my office (room IT 331) by 15:00 on the due date. After the deadline "zero" will be awarded. You must keep a duplicate copy of your work because it may be needed while the original is being marked.

You should hand in with your assignments:
1- A printed listing of your test programs (if any).
2- A brief report to explain your findings.
3- Your solution of questions.

- **Protection by Copyright**

1. Coursework, laboratory exercises, reports, and essays submitted for assessment must be your own work, unless in the case of group projects a joint effort is expected and is indicated as such.
2. Use of quotations or data from the work of others is entirely acceptable, and is often very valuable provided that the source of the quotation or data is given. Failure to provide a source or put quotation marks around material that is taken from elsewhere gives the appearance that the comments are ostensibly your own. When quoting word-for-word from the work of another person quotation marks or indenting (setting the quotation in from the margin) must be used and the source of the quoted material must be acknowledged.
3. Sources of quotations used should be listed in full in a bibliography at the end of your piece of work.

- **Avoiding Plagiarism**.

1. Unacknowledged direct copying from the work of another person, or the close paraphrasing of somebody else's work, is called plagiarism and is a serious offence, equated with cheating in examinations. This applies to copying both from other students' work and from published sources such as books, reports or journal articles.
2. Paraphrasing, when the original statement is still identifiable and has no acknowledgement, is plagiarism. A close paraphrase of another person's work must have an acknowledgement to the source. It is not acceptable for you to put together unacknowledged passages from the same or from different sources linking these together with a few words or sentences of your own and changing a few words from the original text: this is regarded as over-dependence on other sources, which is a form of plagiarism.
3. Direct quotations from an earlier piece of your own work, if not attributed, suggest that your work is original, when in fact it is not. The direct copying of one's own writings qualifies as

plagiarism if the fact that the work has been or is to be presented elsewhere is not acknowledged.

4. Plagiarism is a serious offence and will always result in imposition of a penalty. In deciding upon the penalty the Department will take into account factors such as the year of study, the extent and proportion of the work that has been plagiarized, and the apparent intent of the student. The penalties that can be imposed range from a minimum of a zero mark for the work (without allowing resubmission) through caution to disciplinary measures (such as suspension or expulsion).

Course Academic Calendar

Week	Basic and support material to be covered	Homework/reports and their due dates
(1)	Mathematical Preliminaries: Computer arithmetic, round-off error, source of errors	Tutorial 1
(2)	Solution of equations in one variable: Bisection method	Tutorial 2
(3)	Fixed point method, False position method	Tutorial 3, Assignment 1
(4)	Secant method**,** Newton-Raphson method	Tutorial 4
(5)	Interpolation and polynomial approximation, Introduction to interpolation	Tutorial 5
(6) First Exam	Linear and Lagrange interpolation, Newton' s polynomial	Tutorial 6, Assignment 2
(7)	Direct methods for solving linear systems of equations, Gaussian elimination	Tutorial 7
(8)	Pivoting strategy, LU factorization	Tutorial 8
(9)	Iterative methods for solving linear systems	Tutorial 9, Assignment 3
(10)	Jacobi iteration,	Tutorial 10
(11)	Gauss-Seidel iteration	Tutorial 11
(12) Second Exam	Iterative methods for solving nonlinear systems: Fixed point iteration	Tutorial 12, Assignment4
(13)	Iterative methods for solving nonlinear systems: Seidel iteration, Newton's method	Tutorial 13
(14)	Curve fitting techniques: Least-square line	Tutorial 14
(15) Specimen examination (Optional)	Polynomial fitting, Least-square power fit, Least-square exponential fit, Data Linearization and change of variables	Tutorial 15
(16) Final Examination	Review	

Expected workload:

On average students need to spend 2 hours of study and preparation for each 50-minute lecture/tutorial.

Attendance Policy:

Absence from lectures and/or tutorials shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college/faculty shall not be allowed to take the final examination and shall receive a mark of zero

for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.

Feedback

Feedback to you

You will receive feedback on your work and progress in this unit. This feedback may be provided through your participation in tutorials and class discussions, as well as through your assignment submissions. It may come in the form of individual advice, marks and comments, or it may be provided as comment or reflection targeted at the group. It may be provided through personal interactions, such as interviews and on-line forums, or through other mechanisms such as on-line self-tests and publication of grade distributions.

Feedback from you

Concerns or complaints should be expressed in the first instance to the course lecturer. If no resolution is forthcoming then the issue should be brought to the attention of the course representatives who will take the concerns to the course representative meetings (held in weeks). Thereafter problems are dealt with by the department chair and if still unresolved the Dean and then ultimately the Vice President.

At the end of the course, the students will fill a course evaluation sheet, evaluating the contents of the course, its teaching, and assessment methods, and the lecturer. The monitoring of this students' feedback will allows the course quality improvement.

Module References

Programming with mathematica: an Introduction , Wellin,Paul R., Cambridge: Cambridge University Press, 2013