جامعة : المنصورة

كليـة : العلـــوم

قســم : الرياضيات

١- بيانات المقرر		
كود المادة : Math 413	**اسم المقرر :** **Numerical Analysis II**	**المستوى: الرابع**
التخصص : رياضيات	**عدد الوحدات الدراسية: ٣ ساعة معتمدة نظرى ٢: تمارين: ٢ عملى: ٠**	

٢- هدف المقرر :	**For students undertaking this course, the aims are to:** - Obtain approximations of the solutions of boundary value problems nonlinear systems of equations and obtain the solution of linear systems.
٣- المستهدف من تدريس المقرر	
أ- المعلومات و المفاهيم :	**a- Knowledge and Understanding** **On completing this course, students will be able to:** a1 – be aware of some efficient and stable algorithms for finding roots of non-linear systems of equations. a2 – demonstrate knowledge and understanding on finding stable solution algorithms for boundary value problems. a3 – be familiar with the the iterative methods and their use in computing solutions of nonlinear equations. a4 – know and understand how the approximations of solutions of ordinary differential equations.
ب- المهارات الذهنية :	**b- Intellectual Skills** **On completing this course, students will be able to:** b1- find roots of complicated nonlinear problems using MALAB. b2- apply modern methods, techniques, and pitfalls in scientific computing. b3- find approximate values of complicated integrals in one Dimension.
ج- المهارات المهنية الخاصة بالمقرر :	**c- Professional and Practical Skills** **On completing this course, students will be able to:** c1 - write programs with different languages C++, FORTRAN …and execute them to

perform numerical problems. c2 - maintain existing numerical software. c3 - Use programming skills to solve ODE problems.	
d- General and Transferable Skills **On completing this course, students will be able to:** d1- work in team. d2- use the internet to search in Numerical Analysis Resources. d3- manage time.	**د- المهارات العامة :**
Power method for eigenvalues and eigenvectors. Solution of Linear System of Equations – Iterative Methods. 1. Elementary row operations and Gaussian elimination. 2. Jacobi, Gauss-Seidel and SOR methods. 3. ADI and dimensional splitting methods. 4. Multigrid. Least Square approximations and curve fitting. Approximation theory, Chebyshev poly. Fast Fourier transform. Numerical solution of nonlinear systems of Equation (Newton's method). Numerical solution for boundary value problems.	**٤- محتوى المقرر :**
1- Lecturers 2- Tutorials	**٥- أساليب التعليم و التعلم**
The same as normal students, only skeletal disabilities are allowed in the Faculty of Science.	**٦- أساليب التعليم و التعلم للطلاب ذوى القدرات المحدودة**
	٧- تقويم الطلاب :

1- Oral Exam.	to assess	a1-a4, b1-b3,d1-d3	**أ- الأساليب المستخدمة**
2- Final Exam	to assess	a1-a4,b1- b3,c1-c3	
3- Mid-Term Exam	to assess	a1-a4, b1-b3, c1-c3	

ب- التوقيت	1- Oral Eexam week 16 2- Final Exam week 16 3- Mid-Term Exam week 7
ج- توزيع الدرجات	- Mid-Term Examination 10 - Final-Term Examination 80 - Oral Examination 10 - Practical Examination 0 Total 100%
٨- قائمة الكتب الدراسية و المراجع :	
أ- المذكرات	
ب- الكتب ملزمة	Burden R.L. and J. D. Faires, Numerical Analysis, Sixth edition, Brooks/Cole, Pacific Grove, CA, 1997.
ج- كتب مقترحة	Mathews, J. H., and K. D. Fink. Numerical Methods Using MATLAB®. 3rd ed.Prentice Hall, 1999.
د- دوريـــات علميـــة أو نشرات ... الخ	http://www.math.upenn.edu/~wilf/DeturckWilf.pdf http://www.damtp.cam.ac.uk/lab/people/sd/lectures/nummeth98/introduction.htm http://www.columbia.edu/~gb2030/COURSES/E6302/NumAnal.pdf

(أ)مصفوفة المعارف والمهارات المستهدفة من المقرر الدراسى

المحتويات للمقرر	اسبوع الدراسة	المعارف الرئيسية	مهارات ذهنية	مهارات مهنية	مهارات عامة
Power method for eigenvalues and eigenvectors.	1-2	a1,a2	b2	c1	d1,d2,d3
Solution of Linear System of Equations – Iterative Methods. 1. Elementary row operations and Gaussian elimination. 2. Jacobi, Gauss-Seidel and SOR methods. 3. ADI and dimensional splitting methods. 4. Multigrid.	3-5	a3,a4	b1,b2	c1,c2,c3	d1,d2,d3
Least Square approximations and curve fitting.	6-7	a2,a3,a4	b3	c2,c3	d1,d2,d3

Approximation theory, Chebyshev poly.	8-9	a1,a2	b1,b2	c2,c3	d1,d2,d3
Fast Fourier transform.	10	a4	b1,b2	c2,c3	d1,d2,d3
Numerical solution of nonlinear systems of Equation (Newton's method).	11	a1,a2	b1,b2	c2,c3	d1,d2,d3
Numerical solution for boundary value problems.	12-13	a3	b1,b2	c2,c3	d1,d2,d3

أستاذ المادة : أ.د. المتولى محمد العباسى

رئيس مجلس القسم العلمي :ا.د. مجدى الياس فارس