


Sub.	Course Description – توصيف مقرر دراسي – الموضوع	الموضوع	 <b>كليات المعرفة</b> ALMAAREFA COLLEGES
Date		التاريخ	

Course Code & No	MATH 441	رياض 441	رقم المقرر ورمزه
Course Name	Linear Algebra	الجبر الخطي	اسم المقرر
Credit Hours	3 ( 3 + 0 + 1 )	( 1 + 0 + 3 ) 3	عدد الساعات المعتمدة
Pre-requisite	MATH 301	رياض 301	المتطلب السابق

General Description	توصيف عام
<p>In this course, students will learn fundamental concepts of linear algebra in the concrete setting of <math>R^n</math> and use them to solve problems from engineering and other fields and will learn how to use computer software to apply the techniques of linear algebra. Topics include: Matrices and operations with matrices, Determinants, Vector spaces, Independent and dependent sets of vectors, Bases for vector spaces, Linear transformations Eigenvalues and eigenvectors, Orthogonal sets and least squares approximation.</p>	<p>مبادئ أساسية في الجبر الخطي، المصفوفات، المحددات، فضاء المتجهات، المتجهات المعتمدة وغير المعتمدة، قواعد فضاءات المتجهات، التحويلات الخطية، المجموعات المتعامدة.</p>

Course Objectives
<p>By the end of the course, each student should be able to:</p> <ul style="list-style-type: none"> <li>perform basic matrix calculations</li> <li>use matrices to solve systems of linear equations</li> <li>find least-squares solutions of linear systems</li> <li>set up and solve linear systems in applied problems</li> <li>explain the basic concepts of linear algebra (subspace, span, linear independence, basis, dimension)</li> <li>identify and work with these concepts in <math>R^n</math></li> <li>find an orthonormal basis for a subspace</li> <li>identify a linear transformation and find and use its matrix representation</li> <li>compute determinants of matrices</li> <li>compute eigenvalues and eigenvectors of matrices</li> </ul>

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- use eigenvalues and eigenvectors to diagonalize matrices and to solve systems of linear ODEs
- use MATLAB to solve problems involving linear algebra

Course Outlines	مفردات المقرر
<ul style="list-style-type: none"> <li>• Matrices and Systems of Linear Equations</li> <li>• Solution of linear systems</li> <li>• Matrices and matrix algebra</li> <li>• Linear independence</li> <li>• Matrix inverses</li> <li>• Vectors in 2-Space and 3-Space</li> <li>• The Vector Space <math>R^n</math></li> <li>• Subspaces</li> <li>• Orthogonal bases</li> <li>• Linear transformations</li> <li>• Least-squares problems</li> <li>• The Eigenvalue Problem</li> <li>• Determinants</li> <li>• Eigenvalues and eigenvectors</li> <li>• Diagonalization</li> </ul>	

- **Textbooks :**
- Johnson, Riess, and Arnold. *Introduction to Linear Algebra* , 5<sup>th</sup> edition, 2002, Addison-Wesley.
- Kolman & Hill, *Introductory Linear Algebra with Applications*, 7<sup>th</sup> edition, Prentice-Hall, ISBN: 0-13-018265-6.