

# MAT227 Linear Algebra & Differential Equations

## Detailed Syllabus

<b>Instructor/coordinator</b>	DR. ABDELOUAHED EL KHALIL /DR ALAM ZEB	
<b>Credits</b>	4	
<b>Prerequisite:</b>	MATH 113	
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<b>Office Hours:</b>	Please see Time Table on the door of my office SR-89...	
<b>Textbook:</b>	<p><b>Title:</b> "Linear Algebra"</p> <p><b>Authors:</b> Gareth Williams</p> <p><b>Editor:</b> Jones and Bartlett, 2008, 6<sup>th</sup> Edition</p> <p><b>ISBN:</b> 978-0-7637-5753-3</p>	
<b>Course goals:</b>	<ul style="list-style-type: none"> <li>To provide students with a good understanding about concept of matrices, methods of linear algebra and differential equations described in detailed syllabus.</li> <li>To help the students develop the ability to solve problems using linear algebra and linear differential equations.</li> <li>To enhance understanding of students of the above concepts through occasional computer-based homework problems.</li> </ul>	
<b>Methods of assessment:</b>	<ul style="list-style-type: none"> <li>Questions in Lectures and Tutorials</li> <li>Home works, Short Quizzes and Examinations.</li> <li>Participation through Class work and Homework.</li> </ul>	
<b>Proportion of assessment:</b>	<ul style="list-style-type: none"> <li>Mid Term 1: On <b>Tuesday 10 March, 2015</b> 20%</li> <li>Mid Term 2: On <b>Tuesday 28 April, 2015</b> 20%</li> <li>Quizzes, H. Works, Attendance, Participation: 20%</li> <li>Final Examination: 40%</li> </ul>	

**Notice:** All students are invited to ask any questions concerning the course work during the class and /or in the office hours.



Chap	Subject	Contents	Weeks
1.	<b>System of Linear equations and Matrices</b>	Linear systems, matrix notation, augmented matrix of a linear system, reduced echelon form of a matrix, Gauss Jordan Elimination Method.	1,2
2.		Algebra of matrices, Some special matrices, Symmetric matrices, Inverse of a square matrix.	3
2.	<b>Determinants</b>	Determinants, Cofactor expansion, Expansion by Sarrus rule (diagonal method), Properties.	4
		Matrix inverse, Systems of linear equations, Cramer's Rule.	5
3.	<b>Vector Spaces, Linear independence, Basis</b>	Vectors in $R^2$ and $R^3$ , Addition, Subtraction, Scalar multiplication, Zero vector, Dot product of two vectors, Norm of vectors, Distance between two vectors, Angle between two vectors. Orthogonal vectors.	6
		<b>MIDTERM1 (Tuesday 10 March, 2015)</b>	
		General vector spaces and Subspaces, linear combination. Linear independence of vectors, Basis and dimension of a vector space.	7, 8,9
4.	<b>Eigenvalues &amp; Eigenvectors</b>	Eigenvalues & eigenvectors of a square matrix, Eigenvector subspaces.	10
5.	<b>Ordinary differential equations</b>	First order ordinary differential equations: Separable variable differential equations, First order linear differential equations by integrating factor technique, Exact equations differential equations, Homogeneous differential equations, Differential equations by substitution methods, Solving the Bernoulli differential equation.	11,12
		<b>MIDTERM2 (Tuesday 28 April, 2015)</b>	
		Second Order homogeneous differential equations with constant coefficients.	13
		Second order ODEs with constant coefficients, particular solution of the non-homogeneous equation, the undetermined coefficients and variation of constants methods.	14,15
		<b>Revision</b>	16
		<b>FINAL</b>	

