Mechatronics Engineering Lectures

Subject: Mathematical III (Numerical Method) Class: 3rd

Lecture Contents:	**Name: Dr. Laith M.J.**		**Lecture Number:**	**(1)**
	Topics: **1**-Introduction and applications 2-Approximations and errors			
	Contents: **1-** Why do you study the numerical methods, numerical application on some engineering problems, **2-** Round-off and Truncation error, absolute and relative true error definitions, absolute and relative approximation error definitions, examples.			

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	Name: Dr. Laith M.J.		**Lecture Number:**	**(2)**
	Topics: **1-** Numerical Solution of Nonlinear Algebraic Equations (Roots of Equations) 2- Bracketing Methods			
Lecture Contents:	**Contents:** **1-** Introduction and classification methods **2-** Graphical methods, notes about the roots and number of roots, Bisection methods, advantage and disadvantages of Bisection, examples.			

Mechatronics Engineering Lectures

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	Name: Dr. Laith M.J.		**Lecture Number:**	**(3)**
	Topics: **1-** Bracketing Methods 2- Open Methods			
Lecture Contents:	**Contents:** **1-** The False-Position method, Pitfalls of the false-position method, examples. **2-** The main difference between bracketing and open methods, Simple fixed-point iteration method, examples.			

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	Name: Dr. Laith M.J.		**Lecture Number:**	**(4)**
	Topics: 1- Open Methods 2- engineering exercises			
Lecture Contents:	**Contents:** **1-** The two curve graphical method, Newton-Raphson method, Drawbacks of the Newton-Raphson method, examples. **2-** solution of some engineering exercises.			

Mechatronics Engineering Lectures

Subject: Mathematical III (Numerical Method) Class: 3rd

Lecture Contents:	**Name: Dr. Laith M.J.**		**Lecture Number:**	**(5)**
	Topics: 1- Linear Algebraic Equations 2- Singular and ill-conditioned system			
	Contents: **1-** Introduction, Special Types of Square Matrices, classification of the methods for solving systems of linear equations, direct and indirect (iterative) methods, advantage and disadvantage. **2-**.Definition of Singular and ill-conditioned system with examples, Graphical method.			

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Mechatronics Engineering Lectures

Subject: Mathematical III (Numerical Method) Class: 3rd

Lecture Contents:	**Name: Dr. Laith M.J.**		**Lecture Number:**	**(6)**
	Topics: 1- Direct Methods 2- Gauss-Jordan Method			
	Contents: **1-** Gauss Elimination method, pivoting (partial and complete pivoting), forward elimination, backward substitution, examples. **2-**. Gauss-Jordan method procedure, example.			

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Lecture Contents:	**Name: Dr. Laith M.J.**		**Lecture Number:**	**(7)**
	Topics: 1- LU-Decomposition method 2- Indirect (or iterative) methods for solving linear algebraic equations			
	Contents: 1- LU-Decomposition method procedure, example. **2-** Introduction, general form, Converge criteria.			

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Subject: Mathematical III (Numerical Method) **Class**: 3rd

	Name: Dr. Laith M.J.		**Lecture Number:**	**(8)**
	Topics: 1- Jacobi iterative method 2- Gauss-Seidel iterative method			
Lecture Contents:	**Contents:** 1- Jacobi iterative method algorithm, example. 2- Gauss-Seidel iterative method algorithm, example.			

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Mechatronics Engineering Lectures

Subject: Mathematical III (Numerical Method) Class: 3rd

Lecture Contents:	**Name: Dr. Laith M.J.**		**Lecture Number:**	**(9)**
	Topics: 1- Gauss-Seidel iterative with relaxation factor method 2- Solution of Tri-diagonal systems			
	Contents: 3- Gauss-Seidel iterative with relaxation factor algorithm, relaxation factor effects, over-relaxation and under-relaxation example. 2- Tri-diagonal systems form, Thomas Algorithm, example.			

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Mechatronics Engineering Lectures

Subject: Mathematical III (Numerical Method) Class: 3rd

Lecture Contents:	**Name: Dr. Laith M.J.**		**Lecture Number:**	**(10)**
	Topics: 1- Curve Fitting 2- Linear Regression			
	Contents: . 1-Introduction, curve fitting classification, linear and nonlinear regression, linear and nonlinear interpolation. 2- Introduction of linear regression, Least Square Criterion of Linear Regression, Multiple Linear Regression, examples.			

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