Course Syllabus 2141223
Mathematics for Nano Technology

Subject	2141223
Title	Mathematics for Nanotechnology
Credit	3 credits
Faculty	Faculty of Engineering
Term	First Term / Academic Year 2007
Course Instructors	Asst. Prof. Manop Wongsaisuwan
	Asst. Prof. Nisachon Tangsangiumvisai
	Dr. Nuwong Chollacoop
Status of the subject	Core course
Condition	
- Pre-requisite	2301108 Calculus for Engineering II
- Co-requisite	-
Program	Nano Engineering
Degree	Undergraduate
Hours / Week	Lecture 3 hours / Week

Course Description

Systems of Linear Equations, Echelon Form, Linear Transformation, Matrix of Linear Transformation, Determinants, Vector Space, Subspace, Null Space, Column Space, Row Space, Kernel and Range of a Linear Transformation, Linear Independence, Basis, Coordinate Systems, Dimension, Rank, Change of Basis, Eigenvalues and Eigenvectors, Diagonalization, First-order Differential Equation, Linear Second-order Differential Equation, Reduction of Order, Euler' Equation, Power Series Solution, Frobenius Method, Partial Differential Equation, Boundary Value Problem, Tensor, Tensor Conventions, Tensor Operators, Tensor Transformation and Applications, Introduction to Quantum Mechanics, Schrodinger's Equation, Particle in a Box, Mathematical Operators and Calculations: Hermitian, Dirac's BraKet, Eigenvalue, Eigenfunction, Expectation Values, Overview of Nanotechnology, Applications to Scanning Tunneling Microscope Image

Course Evaluation

Quiz	15%
Mid-term Exam	40%
Final Exam	45%

Course Outline

Week	Date	Details	Note
1	13, 17 Aug	Systems of Linear Equations, Echelon Form, Linear Transformation, Matrix of Linear Transformation, Determinants	Make up class for 13th Aug
2	20, 24 Aug	Vector Space, Subspace, Null Space, Column Space, Row Space, Kernel and Range of a Linear Transformation	
3	27, 31 Aug	Linear Independence, Basis, Coordinate Systems	
4	3, 7 Sep	Dimension, Rank, Change of Basis	
5	10, 14 Sep	Eigenvalues and Eigenvectors, Diagonalization	Quiz1
6	17, 21 Sep	First-order Differential Equation, Linear Second-order Differential Equation	
7	24, 28 Sep	Reduction of Order, Euler' Equation	
8	1 - 5 Oct	**Mid-term Examination Week**	
9	8, 12 Oct	Power Series Solution, Frobenius Method	
10	15, 19 Oct	Partial Differential Equation, Boundary Value Problem	Quiz2
11	22, 26 Oct	Tensor, Tensor Conventions, Tensor Operators	
12	29 Oct, 2 Nov	Tensor Transformation and Applications	
13	5, 9 Nov	Introduction to Quantum Mechanics	Quiz3
14	12, 16 Nov	Schrodinger's Equation, Particle in a Box	
15	19, 23 Nov	Mathematical Operators and Calculations: Hermitian, Dirac's BraKet, Eigenvalue, Eigenfunction, Expectation Values	
16	26, 30 Nov	Overview of Nanotechnology, Applications to Scanning Tunneling Microscope Image	
17	4 – 15 Dec	**Final Examination Week**	

Time and Place
Monday   2.00 – 3.30 pm   Room X Building XX
Friday   8.00 – 9.30 am   Room X Building XX

Books
- Lay, D. C., "Linear Algebra and its application", Addison Wesley, 3rd edition, 2003.
- E. Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, 9th edition, 2006.
- Nye, J. F., "Physical Properties of Crystals: Their Representation by Tensors and Matrices", Oxford University Press, Reprint edition, 1985.
- Mortimer, R. G., "Physical Chemistry", Harcourt Academic Press, 2nd edition, 2000.