



Course Syllabus - Semester 1/2009

10-5090 : Analytical and Numerical Engineering Mathematics  
คณิตศาสตร์วิศวกรรมเชิงวิเคราะห์และเชิงตัวเลข

<b>Instructor :</b>	Asso.Prof. Dr. Udomkiat Nontakaew, <a href="mailto:unk@kmutnb.ac.th">unk@kmutnb.ac.th</a> , Room 83-416		
<b>Teaching Assistant :</b>	N/A		
<b>Time &amp; Location:</b>	Sec. 1	TH 9:00-12:00	Room 81-508
<b>Course Descriptions:</b>	Mathematical proofs, Number systems, Algebraic structure, Linear algebra, Vector and matrix, Vector spaces, Calculus of Variation, Numerical error, Numerical discretization, Convergence and stability of scheme, Numerical solution of partial differential equations, Weak formulations, Finite-difference methods, Finite-element methods, Boundary-element methods.		
<b>Outcomes:</b>			
<b>Objectives:</b>	<p>Upon completion of 10-5090, students will be able to:</p> <ul style="list-style-type: none"> <li>- know about the principle of modern engineering mathematics.</li> <li>- use a basic mathematical skill and conceptual comprehension for studying specialised engineering courses such as control system, applied mechanics, conduction heat transfer, computational engineering, ...etc.</li> </ul>		
<b>Textbooks Required:</b>	<p>[1] Vladimir V. Mitin, Dmitri A. Romanov and Michael P. Polis, <i>Modern Advanced Mathematics for Engineers</i>, John Wiley &amp; Sons, Inc., 2001.</p> <p>[2] David Logan, <i>Applied Mathematics</i>, 3 rd Ed. John Wiley &amp; Sons, Inc., 2006.</p> <p>[3] Gouri Dhatt and Gilbert Touzot, <i>The Finite Element Method Displayed</i>, John Wiley &amp; Sons, Inc., 1985.</p>		
<b>Further Reading:</b>	<p>[1] Joseph S. Silverman, <i>A Friendly Introduction to Number Theory</i>, 3rd Ed., Pearson Education Inc., 2006.</p> <p>[2] Douglas Smith, Maurice Eggen and Richard St. Andre, <i>A Transition to Advanced Mathematics</i>, 4th Ed., ITP. 1996.</p> <p>[3] Rowan Garnier, John Taylor, <i>100% Mathematical proof</i>, John Wiley &amp; Sons, 1996.</p>		
<b>Software:</b>			
<b>Prerequisites:</b>			
<b>Expected Prior Knowledge:</b>	Advanced Engineering Mathematics		
<b>Evaluation &amp; Grading:</b>	Midterm	50%	
	Final	50%	

*“Mathematics does not have for its unique objective to eternally contemplate its own navel; it touches nature and some day it will make contact with it.”*

Henri Poincare (1854-1912)

*“It is science that has taught us the way to substitute tentative truth for cocksure error”*

Bertrand Russell (1872-1970)

**Learning Contents:**

Date	Contents	Homeworks
4 June 09	Introduction to the course	HW#1
8 June 09	Mathematical logic	HW#2
18 June 09	Algebraic structure	HW#3
25 June 09	Linear mappings and Matrices	HW#4
2 July 09	Banach and Hilbert spaces	HW#5
9 July 09	Orthonormal bases and Fourier series	HW#6
16 July 09	Operator equations	HW#7
23 July 09	Calculus of variation	HW#8
30 July 09	<b>Midterm</b>	
6 Aug 09	Numerical error, Numerical discretization	HW#9
13 Aug 09	Convergence and stability of scheme	HW#10
20 Aug 09	Numerical solution of partial differential equations, Weak formulations	HW#11
27 Aug 09	Finite-difference methods	HW#12
3 Sep 09	Finite-element methods	HW#13
9 Sep 09	Finite-element methods	HW#14
16 Sep 09	Boundary-element methods	HW#15