

Engineering Mathematics II (10020MS 201200) Spring, 2012

Class Time: T3T4 R3R4

Class Room: 台達 B103

Instructor: Ta-Jen Yen (嚴大任)
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Textbooks: Advanced Engineering Mathematics (2nd edition), *Michael D. Greenberg*, 滄海書局

Grading: Quizzes (x3, 25%)
Midterms (x2, 50%)
Final (25%)

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TA Hours 7-9 pm, Wednesday (R107, MSL Building)

Content:

The subject of *Engineering Mathematics* is comprised of five parts within two semesters:

1. Ordinary Differential Equations
2. Linear Algebra
3. *Multivariable Calculus and Field Theory*
4. *Fourier Methods and Partial Differential Equations*
5. *Complex Variable Theory*

In the second semester, we focus on “*Multivariable Calculus and Field Theory*”, “*Fourier Methods and Partial Differential Equations*”, and “*Complex Variable Theory*” to cover the rationale and of particular the engineering applications. The detailed schedule of this semester is listed below:

Class Schedule of Engineering Mathematics (2012S)

Week	Date	Chapters	Content
1	2/21 - 2/23	SYLLABUS	syllabus, partial derivatives, composite fxn. & chain differentiation
		Ch. 13. DIFFERENTIAL CALCULUS OF FUNCTIONS OF SEVERAL VARIABLES	Taylor series, implicit fns and Jacobians
2	2/27 - 3/1		maxima and minima, Leibniz rule
		Ch. 14. VECTORS in 3-SPACE	dot and cross product, multiple products
3	3/6 - 3/8		differentiation of a vector fxn of a single variable
		Ch. 15 CURVES, SURFACES, AND VOLUMES	curve and line integrals, double and triple integrals
4	3/13 - 3/15		Quiz (1/3): ch. 13 - 14
			surfaces & volumes, surface and volume integrals
5	3/20 - 3/22	Ch. 16. SCALAR AND VECTORS FIELD THEORY	divergence, gradient, curl
			Laplacian, non-Cartesian systems, divergence theorem (Green's identity), Stokes's theorem, irrotational fields
6	3/27 - 3/29	MIDTERM (1/2)	Multivariable Calculus and Field Theory: Ch. 13 - 16
7	4/3 - 4/5		4/3 : holidays
8	4/10 - 4/12	Ch. 17. FOURIER SERIES, FOURIER INTEGRAL, FOURIER TRANSFORM	odd, even & periodic fxn., FS of a periodic fxn, HRE/QRE
			vector space approach, SL theory, periodic & singular SL problems
9	4/17 - 4/19		Fourier integral, Fourier transform
			Quiz (2/3): ch. 17
10	4/24 - 4/26	Ch. 18. DIFFUSION EQUATION	definition about PDE, separation of variables
			FT and LT, (the method of images)
11	5/1 - 5/3		numerical solution
		Ch. 19. WAVE EQUATION	separation of variables: vibration string and membrane
12	5/8 - 5/10		d'Alembert's solution, integral transform for PDE's
		Ch. 20. LAPLACE EQUATION	separation of variables: Cartesian coordinates
13	5/15 - 5/17	MIDTERM (2/2)	Fourier Methods and PDE: Ch. 17 - 19
			non-Cartesian coordinates, FT and LT
14	5/22 - 5/24	Ch. 21. FUNCTIONS OF A COMPLEX VARIABLE	complex numbers and plane, elementary fns, polar form
			additional elementary fns, Multi-valuedness, differential calculus and analyticity
15	5/29 - 5/31		Quiz (3/3): ch. 20 - 21
		Ch. 22. CONFORMAL MAPPING	conformal mapping
16	6/5 - 6/7		bilinear transformation, applications
		Ch. 23. THE COMPLEX INTEGRAL CALCULUS	complex integral, Cauchy's theorem
17	6/12 - 6/14		fundamental theorem, Cauchy integral formula
		Ch. 24. TAYLOR SERIES, LAURENT SERIES, AND THE RESIDUE THEOREM	complex series and TS, Laurent series
18	6/19 - 6/21		classification of singularities, residue theorem
			applications
		FINAL EXAM	Complex Variable Theory: Ch. 20 - 24

This schedule is subject to being adjusted upon actual instruction progress and students' feedback.