MATH 7178 Spring 2007
T 2:00p.m.–4:45p.m., Friday 003

Instructor: Prof. You-lan Zhu
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Office Hours: T 12:30p.m.–1:45p.m., 5:00–6:15 p.m. and by appointment.

Homework will be assigned every lecture. During every lecture students should turn in all the homework problems assigned during the previous week for grading. Homework counts 40% of your grade.

There will be one test, which counts 60 % of your grade. You should expect that an average of 90% or better will be needed for an A, 89% - 80% for a B. Otherwise a C (79% - 60%) or U (below 60%) will be given.

As with most mathematics classes, the material covered in one class usually depends heavily on the material from previous classes. It is very important that you try to keep up with class assignments. If you have any questions, do not hesitate to ask me.

Outline for

MATH 7178
Advanced numerical analysis of methods for PDEs

Text/References books:

1. Strikwerda, J.C., Finite difference schemes and partial differential equations, Second Edition, SIAM, Philadelphia, 2004.

2. Peyret, V., Spectral methods for incompressible viscous flow, Springer, New York, 2002.

3. Gottlieb, D., Hussaini, M.Y., Orzag, S.A., Theory and applications of spetral methods, In: Voigt, R.G., Gottlieb, D., Hussaini, M.Y. (eds.), Spectral methods for partial differential equations, SIAM, Philadelphia, 1984.

4. Fletcher, C.A.J., Computational techniques for fluid dynamics, Volume I, Fundamental and general techniques, Second Edition, Springer-Verlag, Berlin, 1991.

5. Zhu, Y.-l. et.al., Difference methods for initial-boundary-value problems and flow around bodies, Springer-Verlag and Science Press, 1988.

6. Zhu, Y.-l., Wu, X., Chern, I-L., Derivative securities and difference methods, Springer, New York, 2004.

	Titles of topics	Text/Reference book
1	Hyperbolic equations	1
2	Formulation of initial-boundary-value problems	6
3	Finite Difference Schemes	1
4	Fourier Analysis and Von Neumann Analysis	1
5	Algorithms for boundary points	5
6	Satbility conditions for variable coefficients	5
7	Order of accuracy	1
8	Dissipation and dispersion	1
9	Parabolic equations	1
10	Finite difference schemes	1
11	Stability analysis	1
12	Well-posed initial value problems	1
13	The Kreiss matrix theorem	1
14	Convergence	1
15	The Lax-Richtmyer equivalence theorem	1
16	Convergence of difference schemes for nonlinear initial-boundary value problems	5
17	The Galerkin spectral method	2, 3, 4
18	Chebyshev polynomials	2
19	The pseudospectral method	2, 3, 4