Ma 221. Syllabus. Summer 2013.

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Classes: MTWR 2:00-4:00, Morton 103.

Office hours:
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Textbook:
[1] Nagle, Saff, and Snider, "Fundamentals of Differential Equations and Boundary Value Problems," 6th edition, Addison Wesley. ISBN 032161321X
[2] M.Tenenbaum and H.Pollard, "Ordinary Differential Equations", Dover. ISBN 0486649407.

Syllabus:

Week 1 (May 16-17)

1.1-1.3 Direction Fields. Isoclines	1.1: # 1-17. 1.2: # 1, 2, 9, 10, 20, 21, 23-28, 30, 31. 1.3: #3, 4, 5, 7, 9, 17, 18.
1.4, 1A, 1D. Euler method. Taylor series method. Phase portrait: Fixed points, Stability	1.4 # 6, 10, 15, 16. 1A. Using Taylor series method, solve the following equations. Estimate the convergence interval for the series: (1) $y'+3y=x^2$, $y(0)=1$. (2) $y''-y=1$, $y(0)=1$. 1D. Sketch phase portrait for equations: (1) $y'=y(1+y)(2-y)$ (2) $y'=y(1+y)(2-y)^2$ (3) $y'=y(1+y)(2-y)^3$ (4) $y'=y^2-5y+6$ Find fixed points and determine, which of them are stable, unstable, or neither.
Hw1 due on Wednesday 5/22	1.2: # 2, 10, 20 1.3: # 5 1.4: # 6 Using Taylor series method, solve equation $y'+3y=x^2$, $y(0)=1$. Sketch phase portrait for equation $y'=y(1+y)(2-y)$.

Week 2 (May 20-24)

2.1, 2.2, 2.3 Separable equations. Linear Equations: Integrating factor, Variation of parameters. 2.4 Exact Equations 2.5, 2.6 Integrating factors. Substitutions. 2.6, 2D Transformations	2.2: #7,8,13,15,16,18,20,26,27(a-c),34,38 2.3: #7,8,14,15,18,20,21,22,30,32,33. 2.4: # 10, 11, 13, 14, 19, 22, 23, 25, 27, 28, 29, 30, 31, 33(a-d). 2.5: # 7, 9, 10, 11, 13, 14, 15, 17, 18 2.6: # 11, 12, 13, 15, 18, 19, 20, 41. 2.6: # 21, 22, 23, 24, 25, 26, 27, 28, 31, 32, 42
Chapter 2 – review; 2E – Clairaut equation Ch. 2 –review; 2H – asymptotics; Integral curves; Riccati eqn.	Review # 1-15, 31-35; 2.6 # 33-40, 43; 2E # (d,e). Review # 16-30, 36-40; # 3 (p.82); 2E (a-e); 2.6: #45, 46
Hw2 due on Tuesday 5/28	2.2: # 8, 16, 18, 38 2.3: # 8, 14, 18, 20, 22, 30 2.4: # 10, 14, 22, 28, 30 2.5 # 10, 14 2.6 # 24, 26, 28, 34, 36, 38 Review # 4, 8, 12, 16, 20, 24, 28, 32, 36, 40 2E (d)

Week 3 (May 28-31)

4.1, 4.2, 4.3 Homogeneous second-order linear equations 4.4, 4.5, 4.6 Inhomogeneous linear equations	4.1: # 4, 5, 7, 8 4.2: # 1, 2, 3, 4, 13, 14, 15, 16, 17, 18 4.3: # 9-14, 21-26, 28, 31, 32, 34 4.4: # 9-14 4.5 # 17-22, 23-30 4.6: # 1-10
6.1, 6.2 Eigenvalue problems	6.1: # 16, 17, 19, 20 6.2: # 1-6, 15, 19-21 Solve equations: (1) $y''+y'-2y=0$, $y(0)=0$, $y(1)=1$ (2) $2y''+y'-3y=1$, $y(0)=1$, $y(1)=0$ (3) $y''+y'-2y=x$, $y(0)=2$, $y(1)=1$ Find λ for which the following equations have nonzero solutions: (4) $y''+\lambda y=0$, $y(0)=y(1)=0$. (5) $y''+\lambda y=0$, $y(0)=y(\pi)=0$. (6) $y''+\lambda y=0$, $y(0)=y(L)=0$. (7) $y''+\lambda y=0$, $y'(0)=y(L)=0$. (8) $y''+\lambda y=0$, $y(0)=y'(L)=0$. (9) $y''+\lambda y=0$, $y'(0)=y'(L)=0$.
Hw3 due on Wednesday 6/5	4.1: # 8 4.2: # 2, 14 4.3: #10, 28, 32 4.4: # 10, 14 4.5: # 18, 22, 30 4.6: # 2, 6 6.1: # 16, 20 6.2: # 4, 6, 20

Week 4 (June 3-7)

4.7 Cauchy-Euler equations. Reduction of Order 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8	4.7 # 9-18, 19-20, 37-40, 41-43, 44, 45-49 7.8 # 14-20; 7.7 # 15-22 7.6 # 29-37
No Hw due this week	

Week 5 (June 10-14)

PDEs 10.2, 10.3, 10.4, 10.5, 10.6, 10.7	10.2 # 9-14, 15-18 10.5 # 1-5, 9, 10, 13, 14. 10.6 # 1-4, 7, 8, 13-18 10.7 # 1-5, 7, 8, 11-13.
Hw4 due on Tuesday 6/18	4.7 # 10 7.8 # 20 7.7 # 22 7.6 # 36 10.2 #14 10.5 # 4, 14 10.6 # 4, 8. 10.7 # 4, 12.

Week 6 (June 17-21)

MT – Review Wednesday 6/19 – midterm exam Thursday – solution of the exam.	**Review all the above problems**

Final Exam (cumulative): Saturday June 29.