**LEHIGH UNIVERSITY**

**Department of Mechanical Engineering and Mechanics**

**ME413 NUMERICAL METHODS in ENGINEERING Fall 2010**

**Lecture Schedule**

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| **Date** | **No** | **Weekly Topics** | **Weekly Reading** | **Assignments** | **Due** |
| Aug 30  Sep 1 | 1  2 | Review of Taylor Series  Rational Approximations  Chebyshev Economization | Notes + Chapter 1 | **HW1:**   **S1.2**: Problems 15b, 25, 39, 45, 52 ;  **S2.2** : Problems 9, 17, 27;  **S3.1** : Problem 1, 2, 9;  **S3.2 :** Problem 4, 10, 14;  **PA1 :** **S2.2** : Computer Problem 18 | **9/15/10** |
| Sep 6  Sep 8 | 3  4 | Loss of Significance  Solution of Nonlinear Equations | Notes + 2.1, 2.2 & Chapter 3 |
| Sep 13  Sep 15 | 5  6 | Review of Linear Algebra & Systems of Linear Equations – Computer Implementation | Notes + Chapter 7 | **HW2: S7.1**: Problem 3b, 4, 7a, 7b, 7c;  **S7.2** : Problems 3, 6, 10, 17;    **PA2 :** **S7.2** : Computer Problems 2 and 3 using Gauss and Solve (check with MATLAB)  **S7.3** : Computer Problem 4  (check with MATLAB) | **9/29/10** |
| Sep 20  Sep 22 | 7  8 | Iterative Improvement  Compact Schemes | Notes + 8.1, 8.2 |
| Sep 27  Sep 29 | 9  10 | Gauss Seidel method  Curve Fitting  Cubic Splines | Notes + Chapter 4  Notes + 9.1, 9.2 | **HW3: S4.1 :** Problems 6, 12, 18;  **CP4.1** :Problem 12;  **S4.3 :** Problems 1, 10, 16;  **S9.2 :** Problems 1, 4, 14;  **PA3:** Prob. 6 of Computer Probls Section 9.2 | **10/13/10** |
| Oct 4  Oct 6 | 11  12 | Curve Fitting - Least Squares  **REVIEW FOR TEST** | Notes + 12.1 |
| Oct 11  Oct 13 |  | **PACING BREAK**  **FIRST TEST** |  |  |  |
| **TEXT: Numerical Mathematics & Computing (6th edition) by Cheney & Kincaid- Thomson Brooks/Cole** | | | | | |

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| **Date** | **No** | **Weekly Topics** | **Weekly Reading** | **Assignments** | **Due Date** |
| Oct 18  Oct 20 | 13  14 | Numerical Integration  Numerical Integration | Chapter 5 | To be announced ( See assignments) | **10/27/10** |
| Oct 25  Oct 27 | 15  16 | Ordinary Diff. Equations  Systems of ODE | Notes + Chapters 10 and 11. | **HW5**: **S10.1** : Problems 3a, 6, 12  **S10.2** : Problems 2a,b,c, 7a, 14a  **S10.3** : Problem 3, 4  **S11.2** : Problem 3, 7b | **11/10/10** |
| Nov 1  Nov 3 | 17  18 | Boundary Value Problems  Boundary Value Problems | Notes + Chapter 14 |
| Nov 8  Nov 10 | 19  20 | Parallel Programming  **Partial Differential Equations** | Notes | **PA5:** An assignment on Ordinary Differential equations ( See assignments) | **11/29/10** |
| Nov 15  Nov 17 | 21 | Heat Conduction  REVIEW FOR TEST | Notes |
| Nov 22  Nov 24 |  | **SECOND TEST** THANKSGIVING |  |  |  |
| Nov 29  Dec 1 | 22  23 | **Partial Differential Eqs**.  **Wave equation**  **Partial Differential Eqs.**  Laplace’s Equation | Notes + 15.1 + 15.2 | **FE**: A take home final exam |  |
| Dec 6  Dec 8 | 24  25 | **Partial Differential Eqs.**  Laplace’s Equation | Notes + 15.3 |  |  |
| **TEXT: Numerical Mathematics & Computing (6th edition) by Cheney & Kincaid- Thomson Brooks/Cole** | | | | | |