**LEHIGH UNIVERSITY**

**Department of Mechanical Engineering and Mechanics**

**EMA 450 ADVANCED NUMERICAL METHODS Spring 07**

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| **Date** | **No** | **Weekly Topics** | **Weekly Reading** | **Assignments** | **Due** |
| Jan 15  Jan 17 | 1  2 | Intro. Eigenvalues  Exact methods | C&K [ 8.3 & Appendix D]  And NOTES | C&K :  Problems  **8.3** – 2, 3, 4, 8  Computer Prob  **8.3** – 1  **8.4** - 1 | **Jan 31** |
| Jan 22  Jan 24 | 3  4 | Power method  Similarity transform.  Jacobi Method | C&K [ 8.4 ]  and NOTES |
| Jan 29  Jan 31 | 5  6 | QR decomposition  VEGA and Basic Unix | NOTES | C&K :  Problems  **12.3** – 22, 26, 27, 28  Computer Prob.  **8.3** – 2, 6 | **Feb 14** |
| Feb 5  Feb 7 | 7  8 | Singular Value Decomposition  IMSL Libraries | C&K [end of 8.3 & 12.3 pages 549-555] |
| Feb 12  Feb 14 | 9  10 | Ordinary Differential Equations | NOTES | Assign. #3  (see Web site) | **Feb 28** |
| Feb 19  Feb 21 | 11  12 | **REVIEW FOR TEST**  **FIRST TEST** |  |
| Feb 26  Feb 28 | 13  14 | Partial Diff. Equations | NOTES | Assign. #4  (see Web site) | **Mar 12, 14, 21** |
| **SPRING BREAK** | | | | | |
| **Date** | **No** | **Weekly Topics** | **Weekly Reading** | **Assignments** | **Due** |
| Mar 12  Mar 14 | 11  12 | Advanced Methods for Partial Diff. Equations | NOTES | Assign. #5  (see Web site) | **March 28** |
| Mar 19  Mar 21 | 13  14 | Parallel Programming  MPI introduction | NOTES |
| Mar 26  Mar 28 | 15  16 | Fast Fourier Transforms | NOTES and  N R [ Chapter 12] |  |  |
| Apr 2  Apr 4 | 17  18 | Parallel Programming  MPI introduction | NOTES |  |  |
| Apr 9  Apr 11 | 19  20 | Finite Elements | NOTES |
| Apr 16  Apr 18 |  | **REVIEW FOR TEST**  **SECOND TEST** |  |  |  |
| Apr 23  Apr 25 | 21  22 | Monte Carlo Methods & Simulation | C&K [ Chapter 13 ]  and NOTES |
| **Final Exam** | | | | | |
| **C&K: Numerical Mathematics and Computing Cheney & Kincaid – 5th Edition**  **N R : Numerical Recipes Press, Flannery, Teukolsky & Vetterling – Free on line** | | | | | |