Syllabus

**MTH 233: Differential Equations**
**Textbook:** Differential Equations, 3rd ed., by Blanchard, Devaney, and Hall , 2006, Thomson Brooks-Cole Publishing company

| Hour | Section | Section Title | Homework Assignment |
|---|---|---|---|
| 2 | 1.1 | Modeling Via Differential Equations | 3 5 6 10 15 16 |
| 2.5 | 1.2 | Analytic Technique: Separation of Variables | 11 18 19 28 31 32 |
| 1.5 | 1.3 | Qualitative Technique: Slope Fields | 7 8 9 10 14 15 |
| 1 | 1.4 | Numerical Technique: Euler's Method | 6 7 15 18 |
| 1 | 1.5 | Existence and Uniqueness of Solutions | 5 6 10 12 17 |
| 1.5 | 1.6 | Equilibria and the Phase Line | 8 20 29 30 33 37 |
| 1 | 1.8 | Linear Equations | 2 3 10 11 30 |
| 1.5 | 1.9 | Integrating Factors for Linear Equations | 3 10 11 19 24 25 26 27 |
| 1 | 2.1 | Modeling via Systems | 8ab 9(i) 10(ii) 19 |
| 1.5 | 2.2 | Direction Fields for Systems | 9 11 14a 21 |
| 2 | 2.3 | Analytic Solution Methods for Special Systems | 5 6 7 8 9(a) 10(a) 17 19(a-c) |
| 2.5 | 3.1 | Properties of Linear Systems, Linearity Principle | 5 14 16 18 26 29 34 |
| 2.5 | 3.2 | Straight Line Solutions of Linear ODEs | (2 3 6 8)adde 12 13 14 22 |
| 2 | 3.3 | Phase Plane for Linear Systems: Real Eigenvalues | 2 3 11 12 27 |
| 3 | 3.4 | Complex Eigenvalues | (3 4 6)abcd 13ab 14ab 15 23 |
| 1.0 | 3.5 | Special Cases: Repeated and Zero Eigenvalues | 5ab 11 19abef |
| 1.5 | 3.6 | Second Order Linear ODEs | 2 3 9 10 33 38 |
| 1.5 | 4.1 | Forced Harmonic Oscillators | 5 12 14 21 22 30 |
| 1.5 | 4.2 | Sinusoidal Forcing (omit pp. 401-405) | 6 8 12 13 19 20 |
| 1.5 | 4.3 | Undamped Forcing and Resonance | 5 6 14 17 18 |
| 1.0 | 4.4 | Amplitude and Phase of the Steady State (omit pp 426-430) (optional) | 3 4 6 |
| 1.5 | 5.1 | Equilibrium Point Analysis | 2 3 4 10ab |
| 2.0 | 6.1 | Laplace Transforms | 1 2 5 6 12 13 19 22 |
| 1.5 | 6.2 | Discontinuous Functions | 1 2 6 10 11 12 15 |
| 2.5 | 6.3 | Laplace Transforms and Second Order Equations | 17 18 28 29 32 |
| 1.5 | 6.4 | Impulse Forcing and Delta Functions | 2 3 6 7 |
| 1.5 | 6.5 | Convolution | 2 4 5 7 8 9 |
| 1 | 6.6 | Qualitative Theory of Laplace Transforms | 1 3 5 7 |

TOTAL: 45 hours + (5 hours for review sessions and exams)