### Topics and Syllabus

<table>
<thead>
<tr>
<th>Class #</th>
<th>MWF</th>
<th>TR</th>
<th>Text Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I. NUMERICAL ANALYSIS</strong></td>
<td></td>
<td></td>
<td><strong>CHAPRA AND CANALE</strong></td>
</tr>
<tr>
<td>A. INTRODUCTION AND MATLAB REVIEW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Week 1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Mathematical modeling</td>
<td>1</td>
<td>1</td>
<td>Chapter 1.</td>
</tr>
<tr>
<td>2. MATLAB review</td>
<td>2</td>
<td></td>
<td>Chapter 2</td>
</tr>
<tr>
<td><strong>Week 2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. MATLAB review</td>
<td>3</td>
<td>2</td>
<td>Chapter 3</td>
</tr>
<tr>
<td><strong>Week 3</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. ROOTS OF EQUATIONS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Bisection and False Position methods</td>
<td>4</td>
<td>3</td>
<td>Sections 5.1 – 5.4</td>
</tr>
<tr>
<td>2. Newton’s method</td>
<td>5</td>
<td>3</td>
<td>Sections 6.1 – 6.2</td>
</tr>
<tr>
<td><strong>Week 4</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. MATLAB Routines</td>
<td>6</td>
<td>4</td>
<td>Section 6.4</td>
</tr>
<tr>
<td><strong>Week 5</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. MATRIX APPLICATIONS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Introduction, Linear equation systems, Matrices</td>
<td>7</td>
<td>5</td>
<td>Section 8.1</td>
</tr>
<tr>
<td><strong>Week 6</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. EXAM #1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Review</td>
<td>14</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>2. Exam</td>
<td>15</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td><strong>Week 7</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. CURVE FITTING</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Least Squares Regression</td>
<td>16</td>
<td>12</td>
<td>Sections 13.1 – 13.2</td>
</tr>
<tr>
<td><strong>Week 8</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Interpolation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Introduction</td>
<td>17</td>
<td>12</td>
<td>Section 16.1</td>
</tr>
<tr>
<td>b) Splines</td>
<td>18</td>
<td>12</td>
<td>Sections 16.1 – 16.4</td>
</tr>
<tr>
<td>3. MATLAB Routines</td>
<td>19</td>
<td>12</td>
<td>Section 16.5</td>
</tr>
<tr>
<td><strong>Week 9</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Taylor’s series, Finite difference approximation</td>
<td>22</td>
<td>14</td>
<td>Sections 19.1 – 19.2</td>
</tr>
<tr>
<td><strong>Week 10</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G. ORDINARY DIFFERENTIAL EQ’NS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Euler method</td>
<td>23</td>
<td>15</td>
<td>Sections 20.1 – 20.2</td>
</tr>
<tr>
<td>2. Improvement of Euler method</td>
<td>24</td>
<td>15</td>
<td>Section 20.3</td>
</tr>
<tr>
<td><strong>Week 11</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Initial Value Problems using MATLAB</td>
<td>26</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>5. Boundary value problems</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Shooting method</td>
<td>27</td>
<td>17</td>
<td>Sections 22.1 – 22.2</td>
</tr>
<tr>
<td><strong>Week 12</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Finite Differences using EXCEL</td>
<td>28</td>
<td>17</td>
<td>Sections 22.3</td>
</tr>
<tr>
<td><strong>H. EXAM #2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Review</td>
<td>29</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>2. Exam</td>
<td>30</td>
<td>19</td>
<td></td>
</tr>
</tbody>
</table>
**II. STATISTICS**

**A. PROBABILITY DISTRIBUTIONS**
1. 31 20 Sections 6.1 – 6.3
2. 32 20 Sections 6.4 – 6.5

**B. NORMAL DISTRIBUTION**
1. 33 21 Sections 7.1 – 7.3

**III. ENGINEERING ECONOMICS**

**A. FOUNDATIONS OF ENGINEERING ECONOMY**
1. Interest and Equivalence 36 23 1.1 – 1.6

**B. FACTORS: TIME AND INTEREST**
1. Present Worth 38 24 2.1 – 2.5
2. Gradient Factors 39 25 2.6 – 2.9

**C. PRESENT WORTH ANALYSIS**

**D. REVIEW FINAL**
42 28

**E. FINAL (Tuesday 9 December, 8:00 – 10:30 AM) for MWF**
(Friday 12 December, 11:30 – 2:00 PM) for TR

IV.
<table>
<thead>
<tr>
<th>Day of the week</th>
<th>Date</th>
<th>Day #</th>
<th>comments</th>
</tr>
</thead>
</table>
| Wednesday      | 8/20 | 1     | * syllabus, Introduction  
* preview reading assgt., chapter 1 (modeling)  
* HW read chapters 1 and 2  
* problems: 1.8 (due Wednesday 8/27) |
| Friday         | 8/22 | 2     | * review chapter 2 with examples (2.12)  
* in-class example 2.12  
* HW: read chapter 3  
* problems: 2.6, 2.12 (due Wednesday 8/27) |
| Monday         | 8/25 | 3     | * review chapter 3 with examples  
* HW: read: Sections 5.1 – 5.4  
* problem: 3.2 (due Wednesday 8/27) |
| Wednesday      | 8/27 | 4     | * HW due: 1.8, 2.6, 2.12  
* review bisection and false position methods  
* HW: read sections 6.1 – 6.2  
* problem: 5.6 (due Friday 9/5) |
| Friday         | 8/29 | 5     | * review Newton’s method  
* review secant method  
* HW: read 6.4 and 6.5  
* problem: 6.13 (using Newton’s method) (due Friday 9/5) |
| Wednesday      | 9/3  | 6     | * secant method in-class exercise  
* review “fzero” and “roots”  
* HW: read 8.1  
* problem: 6.13 (using fzero) and 6.23 (due Friday 9/5) |
| Friday         | 9/5  | 7     | * Linear algebra introduction  
* problems: 8.1 – 8.2 (due Friday 9/12)  
* HW: read 8.2 |
| Monday         | 9/8  | 8     | * Solving systems of linear equations with MATLAB  
* problems: 8.3, 8.6 (due Friday 9/12)  
* HW: read 9.1 |
| Wednesday      | 9/10 | 9     | * Cramer’s rule  
* problems: 9.4 a, b, & d (due Friday 9/12)  
* HW: read 9.2 – 9.4 |
| Friday         | 9/12 | 10    | * Gauss Elimination  
* problems: 9.6 (due Wednesday 9/17)  
* HW: read 12.1 |
| Monday         | 9/15 | 11    | * Gauss-Seidel  
* problems: write gauss-seidel program and solve 12.2  
(due Wednesday 9/17) |
| Wednesday      | 9/17 | 12    | * review for exam # 1 |
| Friday         | 9/19 | 13    | * Exam # 1  
* HW: read 13.1 – 13.2 |
| Monday         | 9/22 | 14    | * review Exam #1 |
| Wednesday      | 9/24 | 15    | * least squares regression  
* HW: read 13.3  
* problem: 13.4 (show table and work; due Wednesday 10/1) |
Monday 9/29 17
* splines
* HW: read 16.3 and 16.4
* problems: 16.10; due Wednesday 10/1

Wednesday 10/1 18
* MATLAB routines: spline, polyfit, polyval, interp2
* HW: read 17.1 – 17.4

Friday 10/3 19
* Trapezoid rule for numerical integration
* problem: 17.2 (due Wednesday 10/15)

Monday 10/6 20
* MATLAB methods for numerical integration
* HW: read 19.1 – 19.2
* HW: 17.2, 17.4, using “trapz” and “int” (due Wednesday 10/15)

Wednesday 10/8 21
* Finite difference approximation
* HW: read 20.1 – 20.2
* problems: 19.16 & 19.17 (inflection points are where 2nd derivative = 0) (due Wednesday 10/15)

Friday 10/10
* It’s a holiday!!!!!
* Fall Break

Monday 10/13 22
* Euler’s (pronounced “oiler’s”) method
* problems: 20.1 (a and b only) (due Monday 10/20)
* HW: read 20.3

Wednesday 10/15 23
* Heun’s method
* problems: 20.1 (using Heun’s method) (due Monday 10/20)
* HW: read 20.4 and 20.5

Friday 10/17 24
* Runge-Kutta method
* problem: 20.1 d only (due Monday 10/20)

Monday 10/20 25
* initial value problems, higher order and multi-variate problems:
* read 22.1 – 22.2

Wednesday 10/22 26
* shooting method for BVP’s
* problem: 22.3 (due Monday 10/27)
* read: 22.3

Friday 10/24 27
* finite difference method
* problem: 22.3 using FDM (due Monday 10/27)

Monday 10/27 28
* review for exam #2

Wednesday 10/29 29
* Exam # 2

Friday 10/31 30
* review exam # 2
Monday 11/3 31 * probability distributions
* read 6.1 – 6.5 (Bluman)
* problems: 6.30, 6.46, 6.63 (due Monday 11/10)

Wednesday 11/5 32 * probability distributions
* read 7.1 – 7.3
* problems: 6.64(a-d), 6.65, 6.89 (due Monday 11/10)

Friday 11/7 33 * normal distributions
* read 7.4 – 7.6

Monday 11/10 34 * normal distributions
* problems: 7.136, 7.138(a,c,f,i), 7.140, 7.149, 7.151 (due Monday 11/17)
* HW: read chapter 8.1 – 8.2

Wednesday 11/12 35 * confidence intervals
* HW: read chapter 8.3 – 8.5

Friday 11/14 36 * confidence intervals (cont’d)
* problems: 8.14, 8.24, 8.46, 8.57, 8.79 (due Wednesday 19 Nov)
* HW: read: 1.1 – 1.6 (Blank & Tarquin)

Monday 11/17 37 * Engrg. Econ. Interest and Equivalence
* HW: read 1.7 – 1.12

Wednesday 11/19 38 * Symbols, Cash Flow, Spread Sheet Analysis
* HW: read 2.1 – 2.5
* problems: 1.7, 1.13, 1.17, 1.24, 1.29, 1.32, 1.34, 1.39 (due Monday 24 Nov)

Friday 11/21 39 * Present Worth
* HW: read 2.6 – 2.9

Monday 11/24 40 * Gradient Factors
* example problems: 2.1, 2.2, 2.21, 2.35, 2.45, 2.50, 2.55
* HW: read 5.1 – 5.9
* problems: 2.18, 2.22, 2.34, 2.42, 2.48, 2.54

Monday 12/1 41 * Present and Future Worth & Spread Sheet Applications
* problems: 5.6, 5.17, 5.18, 5.26, 5.28, 5.34

Wednesday 12/3 42 * review for final

Friday 12/5 43 * ???????

Tuesday 12/9/08 * Final Exam (8:00 – 10:30 AM)