## Sample Syllabus for Introduction to Finite Element Method

Instructor: Madhukar Vable Office Hours:

Office:
Phone:
e-mail: mavable@mtu.edu
Web. Address: http://www.me.mtu.edu/\~mavable
Book(optional): Robert D. Cook "Finite Element Modeling For Stress Analysis", John Wiley \& Sons, New York 1995
Reference Books: Warren C. Young "Roark’s formulas for stress and strain"
Walter D. Pilkey "Peterson's stress concentration factors"
Grading System: 2 midterm (25\% each), Final (25\%), Lab. Assignments ${ }^{1}$ (25\%) NO MAKE UP EXAM
$\mathrm{D}=55-64 \% \mathrm{D}+=65-69 \% \mathrm{C}=70-74 \% \mathrm{C}+=75-79 \% \mathrm{~B}=80-84 \% \mathrm{~B}+=85-89 \% \mathrm{~A}=90 \%+$

| Class | Section | Topic | Class-Problems | Home Problems |
| :---: | :---: | :---: | :---: | :---: |
| 1 | B. 11 \& B1.6 | Introduction |  |  |
| 2 |  | Mechanics of Materials Review |  |  |
| 3 |  | Mechanics of Materials Review |  |  |
| 4 | N 7.0-7.3 | Energy Methods | 7.3,7.4 |  |
| 5 | N7.4 | Virtual Work | 7.7 | 7.1,7.2,7.5 |
| 6 | N 8.1 | Rayleigh-Ritz |  | 8.2 |
| 7 7 | N 8.1 | Rayleigh-Ritz | 8.6 | 8.3,8.5 |
| 8 | N8.2 | FEM: Lagrange Polynomials |  |  |
| 9 | N8.3,B2.1-2.2 | Axial Elements | 8.8 | 8.9, 8.11 |
| 10 | N8.3-8.4 | Axial Elements, Shaft Elements | 8.10 | 8.13, 8.15 |
| 11 | EXAM 1 |  |  |  |
| 12 | N8.5,B2.3-2.5 | Symmetric Beam Element | 8.23 | 8.21,8.24 |
| 13 | N8.5,B2.3-2.5 | Symmetric Beam Element |  |  |
| 14 | N8.6, B3.1-3.4 | FEM 2-D |  |  |
| 15 | N8.6, B3.8-3.10 | FEM 2-D |  |  |
| 16 | B4.1-4.3 | Storage and Solution |  |  |
| 17 | B4.4-4.7 | Isoparametric elements, Numerical Integration |  |  |
| 18 | B4.8-4.12 | Convergence, Patch Test |  |  |
| 19 | B5.1-5.4,5.6-5.10 | Modeling, Error in Analysis, Mesh Refinemen |  |  |
| 20 | B6.1, 6.4 | Solids of Revolutions |  |  |
| 21 | EXAM 2 |  |  |  |
| 22 | B7.1-7.2,7.4 | Plate and Shell elements |  |  |
| 23 | B6.2 | 3-D Elements |  |  |
| 24 | B8.1,8.2 | 1-D Heat Conduction/ Thremal stresses |  |  |
| 25 | B8.3 | 2-D Steady state heat transfer |  |  |
| 26 |  | REVIEW |  |  |
| 27 | FINAL |  |  |  |


| Lab Number | Instructional Lab. | Assignment Lab |
| :---: | :---: | :---: |
| 1. | September 12th | September 21st |
| 2. | September 26th | October 3 |
| 3. | October 10th | October 17th |
| 4. | October 24th | November 3rd |
| 5. | November 7th | November 14th |
| 6. | November 28 | December 5th |

1. Attendance in Lab is $20 \%$ of your report grade unless excused by Vable. Lab Assignment reports due in class on Monday after the Lab. assignments. 10\% per day deduction for late assignments.
