Course Specifications of
Structural Mechanics - C 222

University: Benha
Faculty: Benha Faculty of Engineering

Course specifications
Programme(s) on which the course is given: Structural Engineering & Utilities Engineering
Major or minor element of programmes: N.A.
Department offering the programme: Civil Engineering
Department offering the course: Civil Engineering
Academic year / Level: 2nd year – 2nd term
Date of specification approval: / /2009

A- Basic Information

Title: Structural Mechanics
Code: C 222
Credit Hours: N.A.
Lecture: 2
Tutorial: 2
Practical: -
Total: 4

B- Professional Information

1 - Overall aims of course:
By the end of the course the students will be able to:
- Understand the basic of stress analysis (Normal stresses-Shear stresses-Combined stresses) of real structures.
- Understand the classical methods of calculating the deformations of real structures.
- Understand the basis for analysis of indeterminate structures.
- Provide the foundation for other design courses such as design of reinforced concrete structures or steel structures.

2- Intended learning outcomes of course (ILOs)
a. Knowledge and understanding:
   a.1 Retrieving the various basic sciences related to the course including structural analysis (I), and properties and strength of materials.
a.2 Recognizing the fundamentals of normal stress calculations in various real structures.

a.3 Recognizing the fundamentals of shear stress and shear flow calculations due to direct shear in various structures.

a.4 Recognizing the fundamentals of shear stress calculations due to Torsion in various real structures.

a.5 Recognizing the equation of deflection for linear analysis of beams using the double integration and conjugate beam methods.

a.6 Recognizing the analysis of indeterminate beams using the equation of the three moments.

b. Intellectual skills

b.1 Apply core course materials to the numerical solution of real-world problems.

b.2 Drawing sketches for normal stress distribution for different real cross section and straining actions.

b.3 Drawing sketches for shear stress and shear flow distribution for different real cross section.

b.4 Interpret any given data to give decisions on using various shapes of cross section to resist Torsion.

b.5 Drawing the elastic lines of different continuous statically determinate beams subjected to deferent loads.

b.6 Expecting the values, types, sing of stresses and deformations of structures as a communication skill.

c- Professional and practical skills

c.1 Deciding which type of stresses are existing at any point in a structure under a specific case of loading.

C.2 The ability to calculate different types of stresses.

C.3 How to solve problems of extra stresses to reach safe or lower stresses in real structures subjected to different types of loads.

C.4 The ability to calculate the deflection of beams under different types of loading.

C.5 The ability to analyze indeterminate beams using the equation of the three moments.

d- General and transferable skills

D.1 Face and solve unexpected technical problems.

D.2 Searching the world-wide web for material.

D.3 Report the basic data required and obtained results.
3- Contents

<table>
<thead>
<tr>
<th>Topic</th>
<th>No. of Hours</th>
<th>Lecture</th>
<th>Tutorial/Practical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review of structure analysis (I), Calculations of Properties of area.</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Normal stresses.</td>
<td>12</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Analysis of shear stresses due to direct shear force</td>
<td>8</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Analysis of shear flow due to direct shear for thin cross sections</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Analysis of shear stresses due to Torsion.</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Analysis of combined stress.</td>
<td>8</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Analysis of the principal stress graphically and analytically.</td>
<td>2</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Mid-term exam.</td>
<td></td>
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<tr>
<td>Calculating of beam deflection using the double integration method.</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Calculating of beam deflection using the conjugate beam method.</td>
<td>8</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Calculating of statically indeterminate beams using the three moment equation.</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>56</td>
<td>28</td>
<td>28</td>
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</tbody>
</table>

4- Teaching and learning methods

4.1- Lectures.

4.2- Problems solution.

5- Student assessment methods

5.1 Sheets to assess Knowledge, understanding, skills.
5.2 Quizzes to assess Knowledge, understanding, skills.
5.3 Mid-term exam to assess Knowledge, understanding, skills.
5.4 Final Exam to assess Knowledge, understanding, skills.

Assessment schedule

Assessment 1 on weeks 1,2
Assessment 2 on weeks 3,4,5
Assessment 3 on weeks 6,7,8,9
Assessment 4 on weeks 10,11,12
Assessment 5 on weeks 13,14
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Weighting of assessments

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mid-Term Examination</td>
<td>30%</td>
</tr>
<tr>
<td>Final-term Examination</td>
<td>60%</td>
</tr>
<tr>
<td>Sheets</td>
<td>5%</td>
</tr>
<tr>
<td>Quizzes</td>
<td>5%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100%</td>
</tr>
</tbody>
</table>

Note: Attendance is expected at all class meetings. If anyone will not be able to attend a class he should inform the instructor beforehand in order to obtain assignments, etc. Make-up exams will not be given except under extreme circumstances. Students are responsible for every homework assignment. Students are encouraged to form study groups for homework and test preparation. **Late sheets are not accepted.**

6- List of references

6.1- Course notes

6.2- Essential books (text books)

- Problem oriented text in Structural analysis and Mechanics I, II
  Bazaraa, A. S.
- Structural Mechanics Michel Bakhoum Volume 1.

6.3- Recommended books

- Structural Analysis, Part 2 Kassem, M. A.
- Theory of structures, Part I and II. El-Dakhakhni, W., M.

6.4- Periodicals, Web sites, ... etc

- N.A.

7- Facilities required for teaching and learning

- Laptop, data show, display screen.

Course coordinator: Assoc. Prof. Dr. Ayman A. Seleemah
Head of Department: Assoc. Prof. Dr. Ashraf Abou-Rayen
Date: / / 2009