A. Basic Information

Course Title: Metal Forming
Code: MDP311
Lecture: 4
Tutorial: 2
Practical: 6
Total: 6
Program on which the course is given: B.Sc. Mechanical Engineering (Productions)
Major or minor element of program: Major
Department offering the program: Mechanical Engineering Department
Department offering the course: Mechanical Engineering Department
Academic year / level: Third Year / First Semester
Date of specifications approval: 10/5/2006

B. Professional Information

1. Overall aims of course
   By the end of the course the students will be able to:
   i- The student will understand, the continuum description of stress and strain through crystalline.
   ii- Studying all the basic theory necessary to understanding of metal working processes.
   iii- Understanding detailed consideration of the theories of yielding and an introduction to the concepts of plasticity.

2. Intended Learning outcomes of Course (ILOs)

By completion of the course, the student should be able to:

a- Knowledge and Understanding

a.8) Current engineering technologies as related to disciplines.

a.13) Concepts, principles and theories relevant to Mechanical Engineering and manufacture;

a.16) Relevant contemporary issues in mechanical engineering.
b- Intellectual Skills

b.4) Combine, exchange, and assess different ideas, views, and knowledge from a range of sources.

b.5) Assess and evaluate the characteristics and performance of components, systems and processes.

b.13) Apply the principles of mathematics, science and technology in problem solving scenarios in mechanical engineering.

c- Professional and Practical Skills

c.2) Professionally merge the engineering knowledge, understanding, and feedback to improve design, product and/or services.

c.16) Analyze experimental results and determine their accuracy and validity;

c.18) Operate and maintain mechanical equipment.

d- General and Transferable Skills

d.1) Collaborate effectively within multidisciplinary team.

d.3) Communicate effectively

d.8) Acquire entrepreneurial skills.
### 3. Contents

<table>
<thead>
<tr>
<th>No</th>
<th>Topic</th>
<th>No. of hours</th>
<th>ILOs</th>
<th>Teaching / learning methods and strategies</th>
<th>Assessment method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Stress and strain relationships for elastic behavior.</td>
<td>2</td>
<td>a.8, a.13</td>
<td>Lecture, class activity</td>
<td>-</td>
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<tr>
<td>2</td>
<td>(State of stress in two dimensions (plane stress) – Mohr's circle of stress in two dimensions – State of stress in three dimensions – Mohr's circle in three dimensions)</td>
<td>4</td>
<td>b.4, a.13, c.2</td>
<td>Lecture, class activity</td>
<td>assignment</td>
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<tr>
<td>3</td>
<td>Description of strain at point. (State of strain in two dimensions (plane stress))</td>
<td>4</td>
<td>b.4, b.13 d.3, d.8</td>
<td>Lecture, class activity</td>
<td>assignment</td>
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<tr>
<td>4</td>
<td>Mohr's circle of strain in two dimensions – State of strain in three dimensions</td>
<td>4</td>
<td>a.16, b.5, c.2</td>
<td>Lecture, Case study</td>
<td>assignment, quiz</td>
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<tr>
<td>5</td>
<td>Elastic stress-strain relations. (Calculation of stresses from elastic strain).</td>
<td>4</td>
<td>c.16, b.5, d.1</td>
<td>Lecture, class activity</td>
<td>assignment</td>
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<tr>
<td>6</td>
<td>Elements of the theory of plasticity</td>
<td>4</td>
<td>a.13, b.13, c.16, d.3</td>
<td>Lecture, class activity</td>
<td>assignment</td>
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<td></td>
<td></td>
<td>Lecture</td>
<td>Class activity</td>
<td>Assignment</td>
<td>Quiz</td>
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<tr>
<td>7</td>
<td>Yielding criteria for ductile metals. &amp; Levey-Mises Equations (Ideal plastic solid).</td>
<td>a.8, c.16, d.8</td>
<td>Case study</td>
<td>lecture, case study</td>
<td>Quiz</td>
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<tr>
<td>8</td>
<td>Midterm exam</td>
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<td>9</td>
<td>Two dimensional plastic flow – slip line field theory.</td>
<td>b.5, c.16, d.1</td>
<td>class activity</td>
<td>lecture, class activity</td>
<td>Assignment</td>
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<tr>
<td>10</td>
<td>Determination of drawing load by consideration of stresses. (work formula for homogenous deformation,)</td>
<td>a.8, b.13, c.2, a.8</td>
<td>class activity</td>
<td>lecture, class activity</td>
<td>Assignment</td>
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<tr>
<td>11</td>
<td>Determination of rod and wire drawing load from local stress evaluation, determination by stress evaluation of the load for close-pass drawing</td>
<td>a.13, b.4, b.5, c.16</td>
<td>Case study</td>
<td>lecture, case study</td>
<td>Assignment</td>
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<td>12</td>
<td>Determination of forging load from local stress evaluation.</td>
<td>b.4, a.13, c.18, d.3</td>
<td>class activity</td>
<td>lecture, class activity</td>
<td>Assignment</td>
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<td>13</td>
<td>Determination of rolling load and power</td>
<td>a.16, a.8, a.13, b.5</td>
<td>class activity</td>
<td>lecture, class activity</td>
<td>Quiz</td>
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<tr>
<td>14</td>
<td>Determination of Extrusion force &amp; Sheet metal forming.</td>
<td>a.8, b.5, c.18, d.8</td>
<td>class activity</td>
<td>lecture, class activity</td>
<td>Oral exam</td>
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<tr>
<td>15</td>
<td>Final exam</td>
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<td>16</td>
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4. **Teaching and Learning Methods**

- Lectures
- Practical training / laboratory
- Seminar / workshop
- Class activity
- Case study
- Assignments / homework

Other _______________

5. **Student Assessment Methods**

- Assignments to assess knowledge and intellectual skills.
- Quiz to assess knowledge, intellectual and professional skills.
- Mid-term exam to assess knowledge, intellectual, professional and general skills.
- Oral exam to assess knowledge and intellectual skills.
- Final exam to assess knowledge, intellectual, professional and general skills.

Other _______________ to assess _____________________

6. **Assessment schedule**

- Assessment 1 Assignments on weeks 2, 3, 4, 5, 6, 8, 9, 10, 11, and 12
- Assessment 2 Quizzes on weeks 4, 7, and 13
- Assessment 3 Mid-term exam on week 8
- Assessment 4 Oral Exam on week 14
- Assessment 5 Final exam on week 15

7. **Weighting of Assessments**

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Mid- Term Examination</td>
<td>20 %</td>
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<tr>
<td>Final- Term Examination</td>
<td>60 %</td>
</tr>
<tr>
<td>Oral Examination</td>
<td>10 %</td>
</tr>
<tr>
<td>Practical Examination</td>
<td>00 %</td>
</tr>
<tr>
<td>Semester Work assignments</td>
<td>05 %</td>
</tr>
<tr>
<td>Other Quizzes</td>
<td>05 %</td>
</tr>
<tr>
<td>Total</td>
<td>100 %</td>
</tr>
</tbody>
</table>

5/6
List of References

7.1 Course Notes
   • none

7.2 Essential Books (Text Books)
   "Element of Metalworking Theory" Geoffrey W. Row.
   "Engineering Material and Their Manufacturing" Dr. Zulquerain Mallic.
   "Mechanical Metallurgy" George E. Dieter.
   "Metal Forming" Fundamental and applications. Taylon Altan, Soo-ik Oh and Harold

7.3 Recommended Books
   Metal Forming Hand Book. SCHULER
   www.springer.com/engineering/book

7.4 Periodicals Web sites, etc
   None

8. Facilities Required for Teaching and learning
   Lecture room equipped with overhead projector
   Presentation board, computer and data show
   Laboratory

Course coordinator: Prof. Dr. Tarek Fouad Ahmed Khalifa
Course instructor: Dr. Aziza Amin Mohamed Sherif
Head of department: Prof. Dr. Prof. Dr. Maher Hegazy
Date: March 18, 2012