# Course specification

**University/Academy:** Damanhour  
**Faculty/Institute:** Science  
**Department:** Physics  

<table>
<thead>
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<th>1. course Data:</th>
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| **Course code:** | PHY (408)  
| **Course title:** | Material science  
| **Specialization:** | Special physics  
| **No. of instructional units:** |  
| | lecture 2hrs/week | practical | 3hrs/week |  
| **Academic year/level:** | 2010-2011  
| | 4th year (second term) |  

<table>
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<th>2. course Aim</th>
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<td>• The course introduces the new and advanced materials and their applications in high technology and daily life.</td>
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<th>3. Intended learning outcome</th>
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<td><strong>a) Knowledge and understanding</strong></td>
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| A1: Define the Diffusion in solids.  
| A2: Define the Mechanical properties of solids and their tests.  
| A3: Recognize the structural of metals and alloys. |  
| **b) Intellectual skills** |  
| B1: Formulate the students creative thought needed to participate in the development of materials science and physics of materials  
### c) Professional skills

- **C1:** Examine the Grain boundaries and deformation.
- **C2:** Dissect the difference between nano-materials, photonic materials.
- **C3:** Examine the physical knowledge to analyze a suitable technique to solve problems.
- **C4:** Examine some physical problems helping in understanding the course parts.

### d) General skills

- **D1:** *Use technology tools like the internet/electronic resources to obtain subject specific information.*, - use a number of computer packages to present information.
- **D2:** *The ability to work in groups:* work with other as a part of a team to collect data and/or to produce reports and presentations.
- **D3:** the ability to communicate improving *Self-learning:* - study independently, set realistic targets and plan work and time to met targets within deadlines.
- **D4:** Write reports *Problem solving:* - Regular problem exercises and example will give students the chance to develop their theoretical understanding and problem.
- **D5:** *The ability to communicate:* Students will have write reports and give oral presentation.

### 4. course content

- Structure of metals
- Equilibrium diagrams.
- Diffusion of solids.
- *Fundamental of mechanical properties.*
- Theory of plasticity.
- Materials testing: Tension, hardness, fatigue and creep.
- Deformation of polycrystalline materials- Grain boundaries and deformation.
- Strengthening mechanisms.
- Heat treatment: recovery, crystallization and grain growth.
- Superconductors, ceramics, liquid- crystals, composite, polymers, nano-materials, photonic materials.

5. **Teaching and learning methods**

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<th>5.1. Teaching will be by lectures, exercises.</th>
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<td>5.2. All learning outcomes are delivered through lectures.</td>
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<td>5.3. All lectures and worked examples are given from the lecturer private notes.</td>
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Instructional Methods include:

- Direct Instruction: lecture, reading, in class research, problem sets, presentations, and guest speakers
- Instructional Materials: textbook; primary and secondary materials, experts from the field, and electronic media
- Team Teaching which will include business, university, and community based partners
- Community based applied concept projects
- Self-directed, cooperative, and collaborative learning projects.

6. **teaching and learning methods for students with special needs**

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<tr>
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<th>1- Over head projector</th>
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<td>2- appropriate teaching accommodation and Computers</td>
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<td>3- Laboratory with computer terminal.</td>
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7. **Student Assessment**

|   | 7-1. Semester Work. |
7-2. Mid-Term Examination.
7-3. **Practical Examination**
7-4. **Final Term Examination**

### a) Procedures used:

- **7.1.** Research and presentation to assess skills of presenting data and discussion.
- **7.2.** Mid-Term Examination To accesses ability to **continue in course**
- **7.3.** practical exam. To access professional and practical skills.
- **7.4.** written exam. To accesses ability to remember & understand scientific background.

### b) Schedule:

- **Assessment 1:** Semesterwork  Week: 4-8
- **Assessment 2:** Mid-term  Week: 10
- **Assessment 3:** Practical final  Week: 12
- **Assessment 4:** Written final  Week: 14

### c) Weighing of Assessment:

- **Mid-Term Examination:** 10
- **Final-Term Examination:** 100
- **Practical Examination:** 30
- **Semester Work:** 10

**Total:** 150

### 8. List of Textbooks and References:

**a) Course Notes**  Lecturer private notes
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<tr>
<td>c) Recommended Books</td>
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<td>d) Periodicals, web sites,...,etc</td>
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**Course Instructor:** Dr. Nazeh

**Head of Department**

**Date:** -----/-----/-----

Prof. Dr. El. M. Elmaghrby