Basic Data

1) General goals of the course

The course is designed to help student-teachers achieve the following goals:

The student has to know:

1. The historical development of atomic physics.
2. Structure of the atom and generation of X-rays.
3. Effect of external magnetic fields on atoms.

2) Operational learning objectives of the course

By the end of this course, student teachers are expected to achieve the following objectives:

A) Knowledge and Comprehension:

The students have to recognize the following:

1. The historical development of the atomic structure including Bohr's model Sommenfield model and Vector model.
2. X-ray production and properties.
3. Normal and Anomalous Zeeman effects.
B) Cognitive Skills:

1. Relate the concepts of physics to contemporary, historical, technological, and societal issues; in particular, relate concepts of physics to current controversies, such as those around energy uses and medical research, as well as other issues.

2. Apply mathematics, including calculus and statistics, to investigations in physics and the analysis of data.

C) Practical Skills:

1. Locate resources, design and conduct inquiry-based open-ended investigations in physics, interpret findings, communicate results, and make judgments based on evidence

2. Construct new knowledge for themselves through research, reading and discussion, and reflect in an informed way on the role of science in human affairs.

3. Understand and promote the maintenance of a safe science classroom, including the appropriate use and storage of scientific equipment, and the safe storage, use, and disposal of chemicals.

D) Enabling Skills:

1. Demonstrate competence in the practice of teaching as defined within the Entry-Level Standards.

2. Create and maintain an educational environment in which conceptual understanding will occur for all science students.

3. Demonstrate competence in the practice of teaching through investigative experiences and by demonstrating the application of the scientific process and assessing student learning through multiple processes.

4. Develop an understanding and appreciation for the nature of scientific inquiry.
### Contents

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<td>Lectures</td>
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| First | • Historical background.  
• Thomson's model. | 2 | 3 | 5 |
| Second | • Rutherford's Model.  
• Line spectrum – Energy levels. | 2 | 3 | 5 |
| Third | • Hydrogen atom spectrum.  
• Bohr's atomic model. | 2 | 3 | 5 |
| Fourth | • Frank – Hertz Exp.  
• Sommerfield Model. | 2 | 3 | 5 |
| Fifth | • Vector model.  
• Many electron atoms. | 2 | 3 | 5 |
| Sixth | • Stern –Gerlach experiment.  
• Pauli Exclusion Principle. | 2 | 3 | 5 |
| Seventh | • Periodic table.  
• X- rays. | 2 | 3 | 5 |
| Eighth | • X-rays production.  
• X-rays line spectra. | 2 | 3 | 5 |
| Ninth | • X-rays continuous spectra.  
• Electronic configuration. | 2 | 3 | 5 |
| Tenth | • The normal Zeeman Effect. | 2 | 3 | 5 |
| Eleventh | • Anomalous Zeeman Effect. | 2 | 3 | 5 |
| Twelfth | • Double fine structurer. | 2 | 3 | 5 |
| Thirteenth | • Selection rules for possible transition. | 2 | 3 | 5 |

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**Activities, tasks and assignments:**

Lectures.  
Problems essay and assignments.

**Assessment and Evaluation tools:**

- Semester activities including classroom interactions and Quizzes.  
- Mid – term exam  
- Lab performance evaluation.  
- Oral exam.
**Summative Evaluation table**

<table>
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<th>Assessment</th>
<th>Score (Grade)</th>
<th>Weight</th>
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<tr>
<td>1. Final exam</td>
<td>68.58%</td>
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<tr>
<td>2. Final written exam</td>
<td>20%</td>
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<tr>
<td>3. Practical exam</td>
<td>11.42%</td>
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<tr>
<td>4. assignments</td>
<td>100%</td>
<td></td>
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</tbody>
</table>

**References:**
- Text books.
  1. An Introduction to atomic and nuclear physics by H.Semat.
  3. Modern Physics by Weidner and sells

**Educational sources:**
- Computer simulation programs and slides.
- Transparencies.
- Manual of solved problems (answer and solutions)

**Course coordinator:**

**Head of the Department:**

**Date:**

**Course coordinator:**

**Head of the Department:**

**Date:**