The course introduces:
- the students to principles of nuclear physics by studying the constituents of the nucleus and the natural radioactivity.
- the students to the principles of classical mechanics as an introduction to study quantum mechanics and its applications.

The course is designed to help student-teachers achieve the following goal:
- Developing a clear understanding of the basic concepts in nuclear physics.
- Building a solid foundation for advanced nuclear physics course.

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 student have to recognize the following:

a.1 The early researches for measuring nuclear dimensions, charges and masses.
a.2 The natural radioactivity and the laws governing it.
a.3 Lagrange's & Hamilton's formulations of mechanics.
a.4 Black body radiation and Planck's hypothesis.

ب- المهارات العقلية:
b.1 Postulates of Q. Mech. And the solution of one dimensional problems for different potential configuration.

c.1 The constituents of the nucleus.
c.2 Photo-electric effect, De-Broglie hypothesis and Heisenberg uncertainty principle.

d.1 Construct new knowledge for themselves through research, reading and discussion, and reflect in an informed way on the role of science in human affairs.
d.2 Create and maintain an educational environment in which conceptual understanding will occur for all science students.

<table>
<thead>
<tr>
<th>المحتويات:</th>
<th>أسبوع</th>
<th>الموضوع</th>
<th>عدد الساعات</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Rutherford theory of alpha scattering. The classical properties of the nuclear radius, charge and mass and how to determine each of them.</td>
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<td>The constituents of the nucleus: election-proton theory, proton- neutron model.</td>
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<td>Applying the principles of wave mechanics to look for the presence of electrons and protons inside the nucleus.</td>
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<td>Discovery of neutrons- quark theory. The nuclear binding energy, nuclear fission and fusion reactions.</td>
<td>8</td>
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<tr>
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<td>The natural radioactivity theory, the laws of radioactive disintegrations. Specific radioactivity and units of radioactivity-branching- Successive radioactivity-radioactive equilibrium</td>
<td>8</td>
</tr>
</tbody>
</table>

أساليب التعليم والتعلم
- Solves and discusses problem sets.
- Submission and class presentation of term papers.
- Computer aided and web based assignments and assessment.
- Visits to industrial and medical institutions and submission of subsequent reports.
- Laboratory work, group discussions, and reports on: volumetric analysis, precipitation, complexometric and redox titrations
- Lectures.
- Laboratory experiments.
- Problems and essay assignments.

Semester activities including classroom interactions and Quizzes.
- Mid-term exam
- Lab performance evaluation.
- Oral exam.
- Final exam.

**Summative Evaluation table**

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Score</th>
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<td>1. امتحان نصف الفصل الدراسي</td>
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<tr>
<td>2. Final written exam</td>
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<td>%10</td>
<td>2. امتحان نهاية الفصل الدراسي</td>
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<td>3. Final practical exam</td>
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<td>3. الاختبار العملي</td>
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<td>4. assignments</td>
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<td>%100</td>
<td>4. أعمال السنة</td>
</tr>
</tbody>
</table>

المجموع
References

Course books:

- Computer simulation programs and slides.
- Transparences.
- Manual of solved problems (answer and solutions)
- Text books:
  - Quantum physics by Eisberg and Resnick.
  - Modern physics and quantum mechanics by Anderson

References

Textbooks

- Handouts and problem sets.
- Electronic, web, and multimedia based resources.
- Lab work.

***************

The required facilities for teaching and learning

- References
- Textbooks
- Handouts and problem sets.
- Electronic, web, and multimedia based resources.
- Lab work.

***************

Coordinator:

Chairman of the Department:

Date: