



Course Specification

— (Bachelor)

Course Title: **Nuclear Physics**

Course Code: **MPHY26351**

Program: **Medical Physics**

Department: **Physics**

College: **Science**

Institution: **University of Bisha**

Version: **1**

Last Revision Date: **5 September 2023**



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A. General information about the course:

1. Course Identification

| | | | | | |
|---|--|----------------------------------|--|--------------------------------|---------------------------------|
| 1. Credit hours: | 3 (2 Lectures + 1 Laboratory) | | | | |
| 2. Course type | | | | | |
| A. | University <input type="checkbox"/> | College <input type="checkbox"/> | Department <input checked="" type="checkbox"/> | Track <input type="checkbox"/> | Others <input type="checkbox"/> |
| B. | Required <input checked="" type="checkbox"/> | | Elective <input type="checkbox"/> | | |
| 3. Level/year at which this course is offered: | 5 th Level / 3 rd year | | | | |
| 4. Course general Description | | | | | |
| This course explores some properties of nuclei, nuclear model, radioactivity, nuclear magnetic resonance, magnetic resonance imaging and the basic experiments in nuclear physic. | | | | | |
| 5. Pre-requirements for this course (if any): | | | | | |
| NA | | | | | |
| 6. Co- requirements for this course (if any): | | | | | |
| NA | | | | | |
| 7. Course Main Objective(s) | | | | | |
| Recognize properties of nuclear physics. | | | | | |

2. Teaching mode (mark all that apply)

| No | Mode of Instruction | Contact Hours | Percentage |
|----|--|---------------|------------|
| 1. | Traditional classroom | 4 | 100% |
| 2. | E-learning | | |
| 3. | Hybrid <ul style="list-style-type: none"> • Traditional classroom • E-learning | | |
| 4. | Distance learning | | |

3. Contact Hours (based on the academic semester)

| No | Activity | Contact Hours |
|----|-------------------|---------------|
| 1. | Lectures | 30 |
| 2. | Laboratory/Studio | 30 |
| 3. | Field | |
| 4. | Tutorial | |
| 5. | Others (specify) | |





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|-------|----|
| Total | 60 |
|-------|----|

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

| Code | Course Learning Outcomes | Code of CLOs aligned with program | Teaching Strategies | Assessment Methods |
|------|--|-----------------------------------|---------------------|---|
| 1.0 | Knowledge and understanding | | | |
| 1.1 | Recognize some properties of nuclei and their models | K2 | Lecturing | Quizzes Homework Midterm exam Final exam |
| 1.2 | Recognize the radioactivity. | K2 | | |
| 2.0 | Skills | | | |
| 2.1 | Solve problems related to nuclear physics.. | S1 | Solve problems | Quizzes Homework Midterm exam Final exam |
| 2.2 | analyze experimental data. | S2 | Practices lab | Reports Practical exam |
| 2.3 | Communicate positively with others. | S4 | Work group | Reports Presentation |
| 3.0 | Values, autonomy, and responsibility | | | |
| 3.2 | Ability to work in team effectively. | V3 | Work group | Reports Presentation |

C. Course Content

| No | List of Topics | Contact Hours |
|----|--|---------------|
| 1. | Some Properties of Nuclei Unit of energy and mass Charge and Mass The Volume and Density of a Nucleus Experiment #1. | 6 |
| 2. | Some Properties of Nuclei The Size and Structure of Nuclei. Nuclear Stability. Experiment #2. | 6 |
| 3. | Nuclear Model Nuclear Binding Energy Applying the Semi Empirical Binding-Energy Formula | 6 |





| | | |
|-------|--|----|
| | Experiment #3. | |
| 4. | Nuclear Model The Liquid-Drop Model. | 6 |
| | Experiment #4. | |
| 5. | Nuclear Model The Shell Model. Nuclear spin | 6 |
| | Experiment #5. | |
| 6. | Radioactivity The Decay Processes Alpha Decay Beta Decay | 6 |
| | Experiment #6. | |
| 7. | Radioactivity Carbon Dating Radioactive Dating Gamma Decay | 6 |
| | Experiment #7. | |
| 8. | Radioactivity Natural Radioactivity Artificial radioactivity Nuclear Reaction | 6 |
| | Experiment #8. | |
| 9. | Nuclear Magnetic Resonance and Magnetic Resonance Imaging Nuclear magneton Nuclear magnetic resonance | 6 |
| | Experiment #9. | |
| 10. | Nuclear Magnetic Resonance and Magnetic Resonance Imaging The potential energy interaction Magnetic resonance imaging | 6 |
| | Experiment #10. | |
| Total | | 60 |

D. Students Assessment Activities

| No | Assessment Activities * | Assessment timing (in week no) | Percentage of Total Assessment Score |
|----|---|--------------------------------|--------------------------------------|
| 1. | Homework, quizzes, reports, and presentation. | 1: 10 | 10 % |
| 2. | First term exam | 7: 8 | 10 % |



| No | Assessment Activities * | Assessment timing (in week no) | Percentage of Total Assessment Score |
|----|-------------------------|--------------------------------|--------------------------------------|
| 3. | Second term exam | 12: 13 | 10 % |
| 4. | Practical exam | End of Semester | 20 % |
| 5. | Final exam | End of Semester | 50 % |

E. Learning Resources and Facilities

1. References and Learning Resources

| | |
|--------------------------|--|
| Essential References | <ul style="list-style-type: none"> - Physics for Scientists and Engineers, 10th Edition, by Raymond A. Serway, John W. Jewett, BROOKS/COLE CENGAGE Learning, Boston USA, (2019). - Nuclear Physics - Graduate Texts in Physics, 1st Edition, Anwar KAMAL, Springer Heidelberg New York Dordrecht London, (2014) |
| Supportive References | <ul style="list-style-type: none"> - Problems and Solutions in Nuclear and Particle Physics, Edited by Sergio Petrer, Springer Nature Switzerland AG., (2019). |
| Electronic Materials | <ul style="list-style-type: none"> - Blackboard. - PowerPoint presentations. - Digital library of University of Bisha https://ub.deepknowledge.io/Bisha |
| Other Learning Materials | NA |

2. Required Facilities and equipment

| Items | Resources |
|----------------------|---|
| facilities | <p>Laboratory equipment</p> <ol style="list-style-type: none"> 1. Operating voltage of the Geiger counter. 2. Statistics of counting. 3. Geiger tube efficiency. 4. Resolving time. 5. Beta decay energy. 6. Gamma spectrometer 7. Alpha spectrometer |
| Technology equipment | Projector or smart board |
| Other equipment | NA |



F. Assessment of Course Quality

| Assessment Areas/Issues | Assessor | Assessment Methods |
|--|---------------------|--|
| Extent of achievement of course learning outcomes. | Teachers, students. | Direct (Final exams), Indirect (Questionnaire). |
| Effectiveness of teaching. | Teachers, students. | Indirect (Questionnaire) |
| Effectiveness of assessment. | Teachers, students. | Indirect (Questionnaire) |
| Quality of learning resources | Teachers, students. | Indirect (Questionnaire) |
| Quality of facilities available | Teachers, students. | Indirect (Questionnaire) |
| Fairness of evaluation | Peer reviewer. | Direct (Final exams reevaluation). |

G. Specification Approval Data

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|--------------------|----------------------------|
| COUNCIL /COMMITTEE | College of Science Council |
| REFERENCE NO. | 1 |
| DATE | 5 September 2023 |

