# Course Specification
## (Bachelor)

| | |
|---|---|
| **Course Title:** | Advanced Physics |
| **Course Code:** | 105Phis-3 |
| **Program:** | Bachelor of Science (Engineering and Computer Science) |
| **Department:** | Physics |
| **College:** | Science and Arts |
| **Institution:** | Najran University |
| **Version:** | 4 |
| **Last Revision Date:** | 08/12/2024 |

## Table of Contents

## A. General information about the course:

### 1. Course Identification

| | | | | | |
|---|---|---|---|---|---|
| **1. Credit hours: ( 3H )** | | | | | |
| | | | | | |
| **2. Course type** | | | | | |
| **A.** | ☐University | ☐College | ☒ Department | ☐Track | ☐Others |
| **B.** | ☒ Required | | ☐Elective | | |
| **3. Level/year at which this course is offered: ( 4th Level)** | | | | | |
| **4. Course General Description:** | | | | | |
| This course is devoted to educate the students with the advanced level learning outcomes and concepts of physics | | | | | |
| **5. Pre-requirements for this course** (if any)**:** | | | | | |
| 104PHIS-4 | | | | | |
| **6. Co-requisites for this course** (if any)**:** | | | | | |
| N.A | | | | | |
| **7. Course Main Objective(s):** | | | | | |
| To educate core part of Physics, in particular the laws such as Ohm's Law, Kirchhoff's Law, Hook's Law, Laws of Thermodynamics, etc. Introducing this course is basically to motivate the students for the detailed understanding of the mechanisms of atomic and crystal structures of material and their electrical, magnetic, thermal and mechanical behavior. In addition to it, solving the numerical problems and answering the reason based questions are working as a tool for the brainstorming of the student. | | | | | |

### 2. Teaching mode (mark all that apply)

| No | Mode of Instruction | Contact Hours | Percentage |
|---|---|---|---|
| 1 | Traditional classroom | 3 | 100% |
| 2 | E-learning | | |
| 3 | Hybrid<br>• Traditional classroom<br>• 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)** | |
| **Total** | | 60 |

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

| Code | Course Learning Outcomes | Code of PLOs aligned with the program | Teaching Strategies | Assessment Methods |
|---|---|---|---|---|
| **1.0** | **Knowledge and understanding** | | | |
| 1.1 | Upon successful completion of this course, students should be able to<br>➢ Describe the basics of Atomic structure, Crystal structure, Electricity, Magnetism, Thermal and Mechanical properties of materials.<br>➢ State the laws, principles, and relations which have been learned during this course, such as the Laws of thermodynamics, Hook's Law, Ohm's Law, Kirchhoff's Law, Aufbau and Pauli exclusion Principle, and Hund's Rule, etc. | K1 | Lecture Dialogue and discussion | semester exam Final exam Homework |
| 1.2 | Upon successful completion of this course, students should be able to<br>➢ Define the corresponding physical quantities, such as quantum numbers, spectral lines, amorphous and crystalline structure, lattice points, Miller indices, unit crystal, primitive cell, resistivity, conductance, conductivity, mobility, current density, magnetic field, | K2 | Lecture Dialogue and discussion | semester exam Final exam Homework |

| Code | Course Learning Outcomes | Code of PLOs aligned with the program | Teaching Strategies | Assessment Methods |
|---|---|---|---|---|
| | paramaagnetism, dimagnetism, ferromagnetism, thermal energy, latent heat, stress, strain etc. either by means of memorizing or by means of recognize.<br>➢ Write the answers of theoretical as well as numerical problems based on these laws, principles and relations. | | | |
| ... | | | | |
| **2.0** | **Skills** | | | |
| 2.1 | Upon successful completion of this course student should be able to<br>➢ Explain the mechanism and concepts of laws, principles, and relations of the physics.<br>➢ Evaluate and appraise the related practical problems | S1 | Lecture Dialogue and discussion | semester exam Final exam Homework |
| 2.2 | Upon successful completion of this course student should be able to develop the creative skill by analyzing the phenomena of physics carried out via experiment. | S3 | Lecture Dialogue and discussion | semester exam Final exam Homework |
| ... | | | | |
| **3.0** | **Values, autonomy, and responsibility** | | | |
| 3.1 | Students should be able to work independently as well as work in groups, interacting constructively with others. | V2 | Lecture Dialogue and discussion | semester exam Final exam Homework reports |
| 3.2 | | | | |
| ... | | | | |

## C. Course Content

| No | List of Topics | Contact Hours |
|---|---|---|
| 1. | **Theoretical Part**<br>Atomic Structures; Crystal Structures; Electricity and Electrical Properties of Materials; Magnetism and Magnetic properties of | 30 |

| | | |
|---|---|---|
| | Materials; Thermal Properties of Materials; Mechanical Properties of Materials. | |
| 2. | **Experimental Part**<br>Introduction to laboratory work; Measurements of Young's Modulus of a wooden beam; Determination of coefficient of viscosity of fluid; Measurement of the value of unknown resistance using Meter bridge; Determination of inductance using RLC series circuit; Analysis of the current voltage characteristics of a PN junction diode / Zener diode / LED; Determination of spring constant using Simple pendulum via dynamical method; Revision for all experiments. | 30 |
| --- | | |
| **Total** | | 60 |

## D. Students Assessment Activities

| No | Assessment Activities * | Assessment timing (in week no) | Percentage of Total Assessment Score |
|---|---|---|---|
| **1.** | First semester exam (Theoretical part) | 7-9 | 7% |
| **2.** | Second semester exam (Theoretical part) | 11-14 | 8% |
| **3.** | Homework (Theoretical part) | 1-15 | 5% |
| **4.** | First semester exam (Experimental part) | 7-9 | 7% |
| **5.** | Second semester exam (Experimental part) | 11-14 | 8% |
| **6.** | Reports on (Experimental part) | 1-15 | 5% |
| **7.** | Final exam (Experimental part) | 17 | 10% |
| **8.** | Final exam (Theoretical part) | 18-20 | 50% |

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

## E. Learning Resources and Facilities

### 1. References and Learning Resources

| | |
|---|---|
| **Essential References** | اساسيات الفيزياء<br>تأليف: فريدريك.ج.بوش - دافيد.أ.جيرد - ترجمة: سعيد الجزيري - محمد امين سليمان- مراجعة: احمد فؤاد باشا–الناشر 2009: الدار الدولية للاستثمارات الثقافية |
| **Supportive References** | Survey and Ramond, Physics of Scientists and Engineers, Sunders College Publication |
| **Electronic Materials** | http://sciencebooksonline.info/physics.html |
| **Other Learning Materials** | **Lecture Notes** |

## 2. Required Facilities and equipment

| Items | Resources |
|---|---|
| **facilities**<br>(Classrooms, laboratories, exhibition rooms, simulation rooms, etc.) | Classroom (20 seats).<br>Laboratories (20 seats). |
| **Technology equipment**<br>(projector, smart board, software) | Pc + data show |
| **Other equipment**<br>(depending on the nature of the specialty) | |

## F. Assessment of Course Quality

| Assessment Areas/Issues | Assessor | Assessment Methods |
|---|---|---|
| Effectiveness of teaching | Student Evaluation | Indirect |
| Effectiveness of Students assessment | Student Evaluation | Indirect |
| Quality of learning resources | Student Evaluation | Indirect |
| The extent to which CLOs have been achieved | Council / Committee | Direct |
| Other | | |

**Assessors** (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

**Assessment Methods** (Direct, Indirect)

## G. Specification Approval

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|---|---|
| **COUNCIL /COMMITTEE** | PLANS AND CURRICULUM COMMITTEE |
| **REFERENCE NO.** | 14450514-0804-00001 |
| **DATE** | 08/12/2024 |