هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

# Course Specifications

| | |
|---|---|
| **Course Title:** | **Advanced Physics** |
| **Course Code:** | **105 Phis-4** |
| **Program:** | • **Bachelor of Engineering**<br>• **Bachelor of Science (in Computer Science)** |
| **Department:** | **Physics** |
| **College:** | **Science and Arts** |
| **Institution:** | **Najran University** |

## Table of Contents

## A. Course Identification

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|---|
| **1. Credit hours:** 4H |
| **2. Course type**<br>**a.** University ☐ College ☐ Department ■ Others ☐<br>**b.** Required ■ Elective ☐ |
| **3. Level/year at which this course is offered:** 4rd Level |
| **4. Pre-requisites for this course** (if any)**:**<br>none |
| **5. Co-requisites for this course** (if any)**:**<br>**N.A.** |

**6. Mode of Instruction** (mark all that apply)

| No | Mode of Instruction | Contact Hours | Percentage |
|---|---|---|---|
| 1 | Traditional classroom | 3 | 60% |
| 2 | Blended | | |
| 3 | E-learning | | |
| 4 | Distance learning | | |
| 5 | Other (Laboratory) | 2 | 40% |

**7. Contact Hours** (based on academic semester)

| No | Activity | Contact Hours |
|---|---|---|
| 1 | Lecture | 33 |
| 2 | Laboratory/Studio | 22 |
| 3 | Tutorial | |
| 4 | Others (specify) | |
| | Total | 55 |

## B. Course Objectives and Learning Outcomes

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| **1. Course Description**<br>**This course is devoted to educate the students with the advanced level learning outcomes and concepts of physics.** |
| **2. Course Main Objective**<br>**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.** |

### 3. Course Learning Outcomes

| | CLOs | Aligned PLOs |
|---|---|---|
| 1 | **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.** | |
| 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, 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** | **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** | |
| 2.2 | **Upon successful completion of this course student should be able to**<br>**Develop the creative skill by analyzing the phenomena of physics carried out via experiment.** | |
| **3** | **Values:** | |
| 3.1 | **The student should be able to demonstrate and evaluate the questions under discussion** | |

## 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 Materials; Thermal Properties of Materials; Mechanical Properties of Materials.** | **33** |
| 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** | **22** |
| | **Total** | **70** |

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

| Code | Course Learning Outcomes | 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.** | **Lecture Dialogue and discussion** | **First midterm exam Second midterm exam Final exam** |
| 1.2 | ➢ **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, 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.** | **Lecture Dialogue and discussion** | **First midterm exam Second midterm exam Final exam** |
| **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** | **Lecture Dialogue and discussion** | **First midterm exam Second midterm exam Final exam** |
| 2.2 | **Upon successful completion of this course student should be able to**<br>**Develop the creative skill by analyzing the phenomena of physics carried out via experiment.** | **Lecture Dialogue and discussion** | **First midterm exam Second midterm exam Final exam** |
| **3.0** | **Values** | | |
| 3.1 | **Students should be able to work independently as well as work in groups, interacting constructively with others.** | **Lecture Dialogue and discussion** | **semester exam Final exam Homework reports** |

### 2. Assessment Tasks for Students

| # | Assessment task* | Week Due | Percentage of Total Assessment Score |
|---|---|---|---|
| 1 | midterm exam | 6 | 10% |
| 2 | Quizzes Homework | weekly | 10% |
| 3 | Lab Assessment 1 (Note Book Evaluation) : | weekly | 10% |
| 4 | Lab Assessment 2 ( midterm lab exam.): | 6 | 10% |
| 5 | Lab Assessment 3 ( Final lab exam.): | 12-13 | 10% |
| 6 | Final Exam | 12-13 | 50% |

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

## E. Student Academic Counseling and Support

**Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :**

**In the beginning of the syllabus, an introductory lecture is offered to introduce course objectives, content, learning outcomes, evaluation methods and schedule of subjects.**

**Faculty member is available 10 hours per week for the individual discussion**

## F. Learning Resources and Facilities

### 1.Learning Resources

| | |
|---|---|
| **Required Textbooks** | **Serway and Ramond, Physics of Scientists and Engineers, Sunders College Publication** |
| **Essential References Materials** | |
| **Electronic Materials** | - |
| **Other Learning Materials** | **http://sciencebooksonline.info/physics.html** |

### 2. Facilities Required

| Item | Resources |
|---|---|
| **Accommodation** (Classrooms, laboratories, demonstration rooms/labs, etc.) | **Class room (40 seats).** |
| **Technology Resources** (AV, data show, Smart Board, software, etc.) | **data show+PC** |
| **Other Resources** (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list) | |

## G. Course Quality Evaluation

| Evaluation Areas/Issues | Evaluators | Evaluation Methods |
|---|---|---|
| **Course specification** | **Council / Committee** | **Direct** |
| **Course report** | **Council / Committee** | **Direct** |
| **Marks evaluation** | **Peer Reviewer** | **Direct** |
| **Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources** | **Student Evaluation** | **Indirect** |

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
**Evaluators** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
**Assessment Methods** (Direct, Indirect)

## H. Specification Approval Data

| | |
|---|---|
| **Council / Committee** | |
| **Reference No.** | |
| **Date** | |