

|                      |               |                             |          |   |     |   |   |   |
|----------------------|---------------|-----------------------------|----------|---|-----|---|---|---|
| <b>Department</b>    | General Study | <b>Major</b>                |          |   |     |   |   |   |
| <b>Course Name</b>   | Physics       | <b>Course Code</b>          | PHYS 101 |   |     |   |   |   |
| <b>Prerequisites</b> | ---           | <b>Credit Hours<br/>CRH</b> | 3        |   | CTH |   | 5 |   |
|                      |               |                             | L        | 2 | P   | 2 | T | 1 |

**Course Description :**

This course is designed even correspond with the training requirements of the specialized departments in colleges.

The course contains the basic concepts in the measure science and provides a simple concept about the scalar and vector quantities. Also, it contains the scientific and applied concept of the motion in one dimension (on a straight line), force, work and energy. Also, the course is designed to give the students a basic knowledge in the thermal physics, electrostatics and electric current. Moreover, the student can able understanding theoretical concepts by using the simple laws.

**General Objective:**

The course enables students to gain the theoretical and practical background in physics.

**Detailed Objectives:**

Trainee will be able to:

- 1- know units of physical quantities in SI
- 2- recognize between the scalar and vector quantities
- 3- apply laws of Newton mechanics in the motion on a straight line
- 4- apply work and energy laws
- 5- apply the basic concepts and laws of the thermal characteristics in the calculation of temperature and heat quantity for material
- 6- apply the basic concepts for the electrostatic and electric current
- 7- implement the practical experiments
- 8- use the previous concepts in the field of his major

**Safety Procedures:**

- 1- Must provide extinguisher and fire detection device
- 2- Follow all instruction given by the trainer
- 3- Always use the appropriate safety tools in the laboratory (safety goggles, lab coat and gloves)
- 4- Don't eat food or drink in the laboratory and leave the work area clean
- 5- Wash the hands well after leaving the laboratory

| Detailed of Theoretical Contents |   |   |
|----------------------------------|---|---|
| Hours                            | Contents  | Assessment Tools  |
| 12                               | <b>1<sup>st</sup> Unit: Measurements, Scalar and Vector Quantities</b> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Chapter One: Measurements</li> <li>• (1-1) Physical Quantities</li> <li>• (1-1-1) Base Quantities</li> <li>• (1-1-2) Derived Quantities</li> <li>• (1-2) Systems of Measurement</li> <li>• (1-3) Prefixes of SI Units</li> <li>• (1-4) Conversion between Units</li> <li>• Chapter Two: Scalar and Vector Quantities</li> <li>• (2-1) Scalar Quantities</li> <li>• (2-2) Vector Quantities</li> <li>• (2-3) Vectors Addition</li> <li>• (2-3-1) Graphical Method</li> <li>• (2-3-2) Cosine Law Method</li> <li>• (2-4) Properties of Vector Addition</li> <li>• (2-5) Vectors Analysis</li> <li>• (2-6) Vectors Product</li> <li>• (2-6-1) Scalar Product (Dot Product)</li> <li>• (2-6-2) Vector Product (Cross Product)</li> <li>• (3) Examples and Problems</li> </ul> | Practical skills<br>Perform home work<br>False and true questions<br>Fill in the blanks questions<br>Multi choice question<br>Matching question<br>Oral presentation and discussion<br>Short oral question<br>Literature question |
| 9                                | <b>2<sup>nd</sup> Unit: Motion, Force, Work and Energy:</b> <ul style="list-style-type: none"> <li>• (1) Introduction</li> <li>• (2) Rectilinear Motion</li> <li>• (2-1) Distance and Displacement</li> <li>• (2-2) Average Velocity</li> <li>• (2-3) Instantaneous Velocity</li> <li>• (2-4) Average Acceleration</li> <li>• (2-5) Instantaneous Acceleration</li> <li>• (3) The Laws of Motion</li> <li>• (4) Newton's Laws of Motion</li> <li>• (4-1) Newton's First Law</li> <li>• (4-2) Newton's Second Law</li> <li>• (4-3) Newton's Third Law</li> <li>• (5) Friction</li> <li>• (6) Work</li> <li>• (6-1) Concept of Work</li> <li>• (6-2) Work done by a Constant Force</li> <li>• (7) Energy</li> <li>• (7-1) Kinetic Energy</li> <li>• (7-2) Potential Energy</li> <li>• (7-3) Conservation of Energy</li> <li>• (8) Examples and Problems</li> </ul>  | Practical skills<br>Perform home work<br>False and true questions<br>Fill in the blanks questions<br>Multi choice question<br>Matching question<br>Oral presentation and discussion<br>Short oral question<br>Literature question |

| Detailed of Theoretical Contents |   |   |
|----------------------------------|---|---|
| Hours                            | Contents  | Assessment Tools  |
| 9                                | <b>3<sup>rd</sup> Unit: Thermal Physics</b> <ul style="list-style-type: none"> <li>• (1) Introduction</li> <li>• (2) Temperature</li> <li>• (3) Temperatures Scales</li> <li>• (3-1) Celsius Scale (<math>^{\circ}\text{C}</math>)</li> <li>• (3-2) Kelvin Scale (K)</li> <li>• (3-3) Fahrenheit Scale (<math>^{\circ}\text{F}</math>)</li> <li>• (3-4) Equations of Convert Temperatures</li> <li>• (4) Quantity of Heat</li> <li>• (5) Difference between Temperature and Quantity of Heat</li> <li>• (6) Specific Heat</li> <li>• (7) Latent Heat</li> <li>• (8) The Concept of Thermal Equilibrium</li> <li>• (9) Methods of the Heat Transfer</li> <li>• (10) Examples and Problems</li> </ul>   | Practical skills<br><br>Perform home work<br><br>False and true questions<br><br>Fill in the blanks questions<br><br>Multi choice question<br><br>Matching question<br><br>Oral presentation and discussion<br><br>Short oral question<br><br>Literature question |
| 9                                | <b>4<sup>th</sup> Unit: Electrostatics</b> <ul style="list-style-type: none"> <li>• (1) Introduction</li> <li>• (2) The Electric Charge</li> <li>• (3) Coulomb's Law</li> <li>• (4) The Electric Field</li> <li>• (4-1) The Electric Field of a Point Charge</li> <li>• (4-2) The Electric Field Lines</li> <li>• (5) Potential Difference and the Electric Potential</li> <li>• (6) The Electric Capacitor (Condenser)</li> <li>• (6-1) Capacitance of the Capacitor</li> <li>• (6-2) Parallel – Plate Capacitor</li> <li>• (6-3) Connecting of Capacitors</li> <li>• (6-3-1) Capacitors in Series</li> <li>• (6-3-2) Capacitors in Parallel</li> <li>• (6-4) The Stored Energy in a Capacitor</li> <li>• (7) Examples and Problems</li> </ul> | Practical skills<br><br>Perform home work<br><br>False and true questions<br><br>Fill in the blanks questions<br><br>Multi choice question<br><br>Matching question<br><br>Oral presentation and discussion<br><br>Short oral question<br><br>Literature question |
| 9                                | <b>5<sup>th</sup> Unit: The Electric Current and Resistance</b> <ul style="list-style-type: none"> <li>• (1) Introduction</li> <li>• (2) The Electric Current</li> <li>• (3) The Current Density</li> <li>• (4) Drift Velocity</li> <li>• (5) Types of The Electric Current:</li> <li>• (5-1) The Direct Current (DC)</li> <li>• (5-2) The Alternating Current (AC)</li> <li>• (6) Ohm's Law and Resistance</li> <li>• (6-1) Ohm's Law</li> <li>• (6-2) Resistance</li> </ul>   | Practical skills<br><br>Perform home work<br><br>False and true questions<br><br>Fill in the blanks questions<br><br>Multi choice question<br><br>Matching question   |

| Detailed of Theoretical Contents |   |   |
|----------------------------------|---|---|
| Hours                            | Contents  | Assessment Tools  |
|                                  | <ul style="list-style-type: none"> <li>• (6-2-1) Resistance and Temperature</li> <li>• (6-2-2) Conductivity</li> <li>• (6-2-3) Resistivity</li> <li>• (6-3) Connecting of Resistors</li> <li>• (6-3-1) Resistors in Series</li> <li>• (6-3-2) Resistors in Parallel</li> <li>• (7) The Electric Energy and Power</li> <li>• (8) Ammeters and Voltmeters</li> <li>• (9) Examples and Problems</li> </ul> | <p>Oral presentation and discussion</p> <p>Short oral question</p> <p>Literature question</p> |

|                  |  |  |
|------------------|--|--|
| <b>Textbooks</b> | <p>• ١- الفيزياء الأساسية تأليف مروان بن أحمد الفهد ، الناشر: العبيكان (الطبعة الثالثة ٤٣٣ هـ)، ISBN 978-603-503-187-7</p>   |  |
|                  | <p>• ٢- الفيزياء العامة تأليف محمد عطية سويلم وآخرون، الناشر: دار الفكر للنشر والتوزيع (الطبعة العاشرة ٤٣٧ هـ-٢٠١٦ م)، ISBN 978-9957-07-390-7</p>  |  |
|                  | <p>• ٣- أساسيات الفيزياء تأليف ف. بوش ترجمة سعيد الجزيري ومحمد أمين سليمان مراجعة محمد عبد المقصود النادي، الناشر: الدار الدولية للاستثمارات الثقافية (الطبعة التاسعة ٢٠٠٥ م) ISBN 977-5107-82-2</p> |  |
|                  | <p>• ٤- الكهرباء والمغناطيسية تأليف غازي ياسين القيسي، الناشر: دار المسيرة للنشر والتوزيع والطباعة (الطبعة الرابعة ٢٠١١ م)</p>   |  |
|                  | <p>• 5- Fundamentals of Physics Extended (10<sup>th</sup> Edition) David Halliday, Robert Resnick and Jearl Walker</p>   |  |

## List of Detailed Equipment for Laboratory, Workshop or Lab

| Hours | No. | Laboratory name | Capacity of training | Human Resources with Certificate |
|-------|-----|-----------------|----------------------|----------------------------------|
| 32    | 1-  | Physics         | 20                   |                                  |

| <b>Lab of Physical Measurements</b> |            |                       |                 |
|-------------------------------------|------------|-----------------------|-----------------|
| <b>Hours</b>                        | <b>No.</b> | <b>Product's Name</b> | <b>Quantity</b> |
| 4                                   | 1-         | calculator            | 20              |
|                                     | 2-         | a vernier caliper     | 20              |
|                                     | 3-         | Micrometers           | 20              |
|                                     | 4-         | Multimeter            | 20              |

| <b>Lab of Force Table</b> |            |                       |                 |
|---------------------------|------------|-----------------------|-----------------|
| <b>Hours</b>              | <b>No.</b> | <b>Product's Name</b> | <b>Quantity</b> |
| 6                         | 1-         | Force Table           | 20              |
|                           | 2-         | Ring and string       | 80              |
|                           | 3-         | 4 Pulleys             | 80              |
|                           | 4-         | 4 Weight Hangers      | 20              |
|                           | 5-         | Masses Protractor     | 120             |
|                           | 6-         | 30-cm Ruler           | 20              |
|                           | 7-         | Protractor            | 20              |

| <b>Lab of Simple Pendulum</b> |            |  |                 |
|-------------------------------|------------|--|-----------------|
| <b>Hours</b>                  | <b>No.</b> | <b>Product's Name</b>  | <b>Quantity</b> |
| 4                             | 1-         | a support stand with a string clamp,                         | 20              |
|                               | 2-         | a small spherical ball with a 125 cm length of light string, | 20              |
|                               | 3-         | a meter stick  | 20              |
|                               | 4-         | a vernier caliper  | 20              |
|                               | 5-         | timer  | 20              |

| <b>Lab of Fletcher's Trolley</b> |            |                              |                 |
|----------------------------------|------------|------------------------------|-----------------|
| <b>Hours</b>                     | <b>No.</b> | <b>Product's Name</b>        | <b>Quantity</b> |
| 4                                | 1-         | 1.2 m aluminum starter track | 20              |
|                                  | 2-         | car                          | 20              |
|                                  | 3-         | pulley with clamp            | 20              |
|                                  | 4-         | adjustable end stops         | 20              |
|                                  | 5-         | 5 ,10, 20,50 gram mass       | 60              |
|                                  | 6-         | string                       | 20              |

| <b>Lab of Latent and Specific Heat</b> |            |  |                 |
|--|------------|--|-----------------|
| <b>Hours</b>                           | <b>No.</b> | <b>Product's Name</b>                          | <b>Quantity</b> |
| 4                                      | 1-         | Calorimeter with stirrer weighing scale        | 20              |
|  | 2-         | Isolated calorimeter                           | 20              |
|  | 3-         | Cup of glass                                   | 20              |
|  | 4-         | Thermometer                                    | 20              |
|  | 5-         | Forceps  | 20              |
|  | 6-         | two metal solids (made of different materials) | 60              |
|  | 7-         | Paper towels                                   | 5               |
|  | 8-         | Small pieces of ice (Templates)                | 10              |
|  | 9-         | Ice maker                                      | 1               |
|  | 10-        | boiler (beaker and hotplate)                   | 1               |
|  | 11-        | Balance 1kg                                    | 2               |

| Lab of Charging of Capacitor and its Discharging |     |  |          |
|--|-----|--|----------|
| Hours  | No. | Product's Name   | Quantity |
| 6  | 1-  | DC Power Supply 30 V, 2 A (230 V, 50/60 Hz)  | 20       |
|  | 2-  | Components in plug-in housings with two plugs separated by 19 mm Capacitor: 1000 $\mu$ F   | 20       |
|  | 3-  | Components in plug-in housings with two plugs separated by 19 mm Resistance: 150K $\Omega$ Tolerance: 5 % Max. power: 2 W                        | 20       |
|  | 4-  | ammeter  | 20       |
|  | 5-  | voltmeter  | 20       |
|  | 6-  | Patch cord with multilam plug / jack , Length: 75 cm, Wire cross-section: 1 mm <sup>2</sup> , Continuous current: max. 19 A, Plug and jack: 4 mm | 120      |
|  | 7-  | Electric load (A variable resistance)  | 20       |

| Lab of Ohm's Law |     |  |          |
|------------------|-----|--|----------|
|                  | No. | Product's Name   | Quantity |
|                  | 1-  | DC Power Supply 30 V, 2 A (230 V, 50/60 Hz)  | 20       |
|                  | 2-  | Components in plug-in housings with two plugs separated by 19 mm Resistance: 470 $\Omega$ Tolerance: 5 % Max. power: 2 W                         | 20       |
|                  | 3-  | Components in plug-in housings with two plugs separated by 19 mm Resistance: 100 $\Omega$ Tolerance: 5 % Max. power: 2 W                         | 20       |
|                  | 4-  | ammeter  | 20       |
|                  | 5-  | voltmeter  | 20       |
|                  | 6-  | Patch cord with multilam plug / jack , Length: 75 cm, Wire cross-section: 1 mm <sup>2</sup> , Continuous current: max. 19 A, Plug and jack: 4 mm | 120      |
|                  | 7-  | Electric load (A variable resistance)  | 20       |