

## Bridging Exemption Test Course Information

### Bridging Exemption Test Course: Physics

#### Overview

This subject is especially suited for students taking 1 semester basic concepts and principles of physics course that can applied later into the study of the field in engineering.

#### Faculty/Programme Group

- Civil
- Electrical
- Chemical & Natural Resources
- Biomedical & Health Science
- Mechanical
- Bioscience & Bioengineering
- Science
- Education
- Computer Science and Information System
- Geomatic Science & Engineering (SGS, SGU, SGG)

#### Topics

##### Introduction & Vector Algebra

Physical Quantities & Symbols, Measurement Units, Symbols, SI (MKS) System, Prefixes, Unit Conversion, Significant Figures, Scientific Notation.

Vector Quantities, Graphical Representation & Components, Unit Vector, Vector Addition, Subtraction, Vector Multiplication – Dot Product, Cross Product.

##### Kinematics

Displacement, Average & Instantaneous Velocity, Acceleration, Motion with Constant Acceleration, Free Falling Objects, Projectile Motion.

##### Dynamics

Mass & Force, Newton's First, Second and Third Law of Motion, Force of Gravity, Normal Force, Free Body Diagram.

##### Work & Energy

Work, Kinetic & Potential Energy, Conservative, Non-conservative Forces, Work-Energy Theorem, Mechanical Energy and Conservation of Energy, Power.

##### Static Equilibrium

Particle, Rigid Body and Centre of Mass, Moment of Force (Torque), Conditions for Equilibrium, Stability and Balance, Hooke's Law, Stress and Strain,

##### Oscillations & Waves

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Oscillation of Spring, Simple Harmonic Motion, Simple Pendulum, Wave Motion, Type of Waves.

### **Electric Charge, Field & Potential**

Charge, Insulators & Conductors, Coulomb's Law, Electric Field & Field Lines, Electric Potential, Capacitor & Capacitance, Energy Storage.

### **DC Circuits**

Current & Resistance, Ohm's Law, Electric Power, EMF & Terminal Voltage, Resistors in Series and Parallel, Kirchhoff's Rules, RC Circuits.

### **Magnetic Field**

Field from Magnet and Electric Current, Force on Moving Charge, Force on Electric Current, Force on Parallel Wires.

### **Optics**

The Ray Model of Light, Reflection & Image Formation by a Plane Mirror & Spherical Mirrors, Index of Refraction, Snell's Law, Ray Tracing & Thin Lens Equation, Magnification

### **Friction and Circular Motion**

Friction Force, Uniform Circular Motion-Kinematics, Uniform Circular Motion-Dynamics.

### **Linear Momentum**

Momentum and Force, Conservation of Momentum, Impulse, Elastic and Inelastic Collisions.

### **Fluids**

Density and Specific Gravity, Pressure in Fluids, Atmospheric and Gauge Pressures, Pascal's and Archimedes' Principles.

### **Temperature & Heat**

Temperature, Zeroth Law of Thermodynamics & Thermometer, Thermal Expansion, Heat and Specific Heat, Calorimetry, Latent Heat, First Law of Thermodynamics.

### **Exam Details**

#### Format

Subjective (50 %)

All calculations must be shown clearly.

#### Duration:

1 hour 30 minutes (no breaks)

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### References

**Textbook:**

Giancoli, D.C., PHYSICS for Scientists & Engineers (4th Edition), Prentice Hall International.

**Others:**

F.W Sears, M. W. Zemansky and H.D Young, College Physics 7<sup>th</sup> edition, Addison-Wesley.

Physics for Science and Engineers, Servey Jewett 7<sup>th</sup> edition Thomson brooks/cole