

# PHYS 109 (462)

**Dr. Abubaker Ahmed Siddig**

**Email: [asiddig@ksu.edu.sa](mailto:asiddig@ksu.edu.sa)**

**Office hours: [see my webpage](#)**

**Where to find**

**Your instructor: [1A51](#)**

**Lectures: [Blackboard](#) (LMS)**

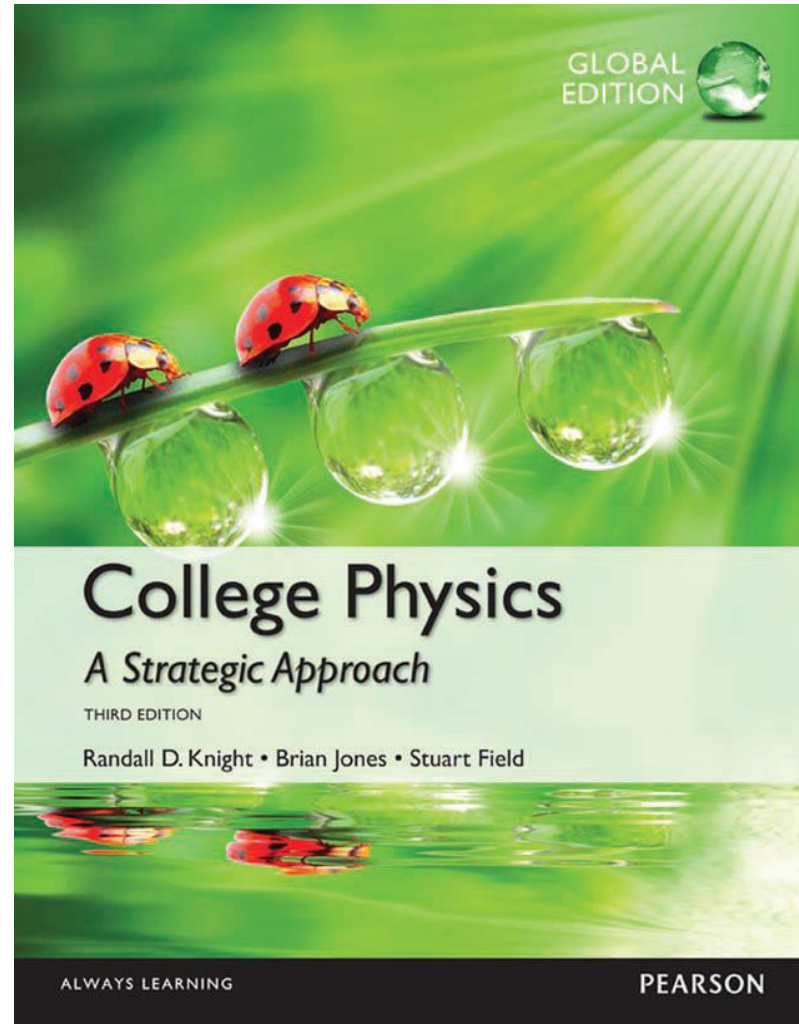
# Textbook

## College Physics, A strategic Approach.

Third edition

Randall D. Knight, Brian Jones and  
Stuart Field, third edition, 2014,  
Pearson,

ISBN-13: 9781292057156



# Marks Distribution

**Credit hours distribution:**

**4** (3+0+2)

**Midterm Exams (M):**

**2x15=30** marks

**Practical Work (Lab):**

**30** marks

**Final Exam (F):**

**40** marks (covering all chapters)

**Total: 100** marks

# Course Outline

From Sunday	Weeks	Chapters	Sections
<b>Part I: Force and Motion</b>			
14/01	01	Chapter 2 Motion in One Dimension	1-5, 7
21/01	02	Chapter 3 Vectors and Motion in Two Dimensions	1, 3, 4
28/01	03	Chapter 4 Force and Motion	1- 7
04/02-11/02	04-05	Chapter 5 Applying Newton's Laws	1-5, 7, 8
18/02	06	Chapter 8 Equilibrium and Elasticity	1, 2
<b>Part II Conservation Laws</b>			
03/03	06	Chapter 9 Impulse and Momentum	1- 5
10/03-17/03	07-08	Chapter 10 Energy and Work	1-4, 6-8
<b>Part III Properties of Matter</b>			
24/03	09	Chapter 13 Fluids	1- 3, 5, 6
<b>Part V Optics</b>			
(Monday) 15/04	10	Chapter 18 Ray Optics	2, 3, 5, 7
<b>Part VI Electricity</b>			
21/04	11	Chapter 20 Electric Fields and Forces	1-5, 7
28/04	12	Chapter 21 Electric Potential	1, 7
		Chapter 22 Current and Resistance	1, 2, 5
<b>Part VII: Atomic, Electromagnetic, and Optical Phenomena</b>			
05/05	13	Chapter 30 Nuclear Physics	1, 4, 5

# Absence Policy

## I. Attendance percentage:

- Student should attend the course lectures and labs during all the weeks of the semester.
- Students with absence hours more than 25% of the total course hours will be banned from the Final Exam.

## II. Absence from Examinations:

- If you are unable to attend an examination (first or second midterm) owing to illness or other unavoidable circumstances, you should provide an acceptable evidence of 'good cause' for such absence to the competent commission. If the absence is regarded as authorized, student will grant a Makeup Exam only once.
- No other Makeup Exam will be done in the same semester. If you miss the Makeup Exam, you will have a mark of zero.

# For Male section:

## Midterm Exams:

Time: from 7:00 to 8:30 pm.

Number of Questions: 15 (10 questions/hour and 1 mark/question)

## Final Exam:

Time: in common with the Female section during daytime for 3 hours.

Number of Questions: 30 (the student **MUST** choose answering 27 questions **ONLY** and 1.5 marks/question)

- If a student answers **ALL** the 27 questions **correctly** ( $27 \times 1.5 = 40.5$ ), he will have 40/40 in the Final and 0.5 marks will be added to the semester activity out of 60 marks.
- The marks of the Final (out of 40 marks) and Term activity (out of 60 marks) must be **integer**, so we round to the next integer **if necessary**. Example: if a student answers 9 questions correctly, he will get 13.5/40 which becomes 14/40.
- The evidence of any absence in the Midterm or Final Exams **must be sent** to the Common First Year “داعم”, they will study the case and **decide** if the absence is regarded as authorized or not.

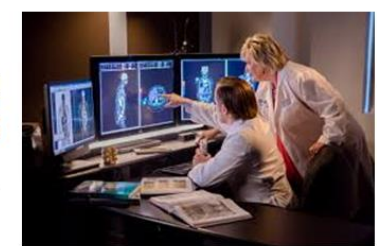
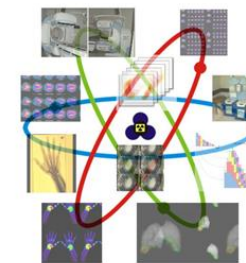
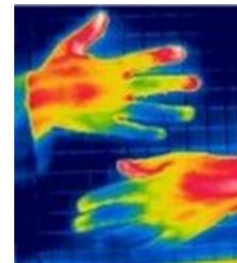
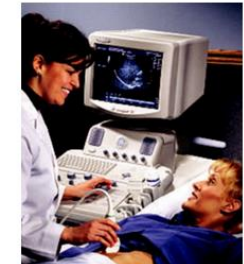
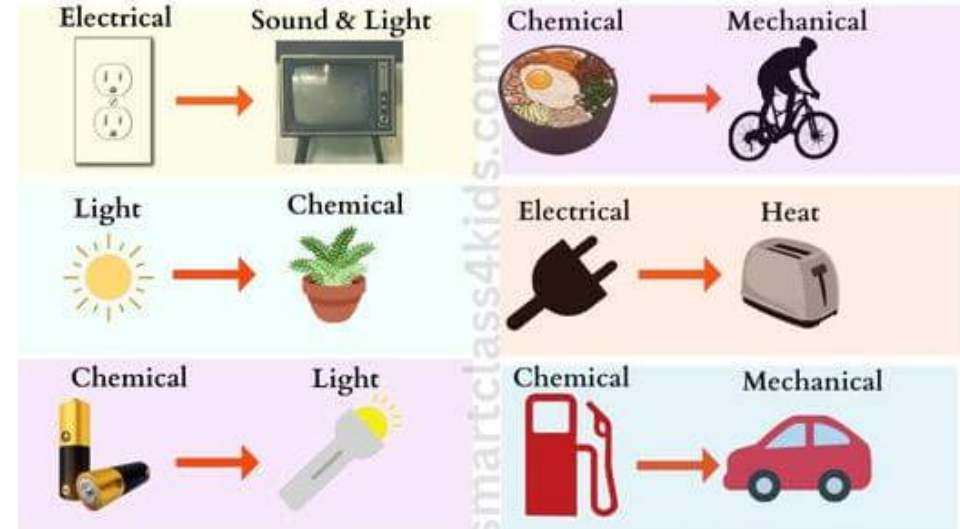
نظام المعاملات الإلكترونية لشؤون الطلاب (داعم)



# Why **PHYSICS** is important?

In daily life?

In medicine?



[Bachelor of Science in Medical Physics – Department of Mathematics & Physical Science \(dkut.ac.ke\)](http://dkut.ac.ke)

[8 Types of Energy For Kids With Examples - Physics For Kids \(smartclass4kids.com\)](http://smartclass4kids.com)

# How Do Stethoscopes Work?

When a doctor or nurse, place the diaphragm of the stethoscope on the patient's skin, it amplifies the sounds the body produces.

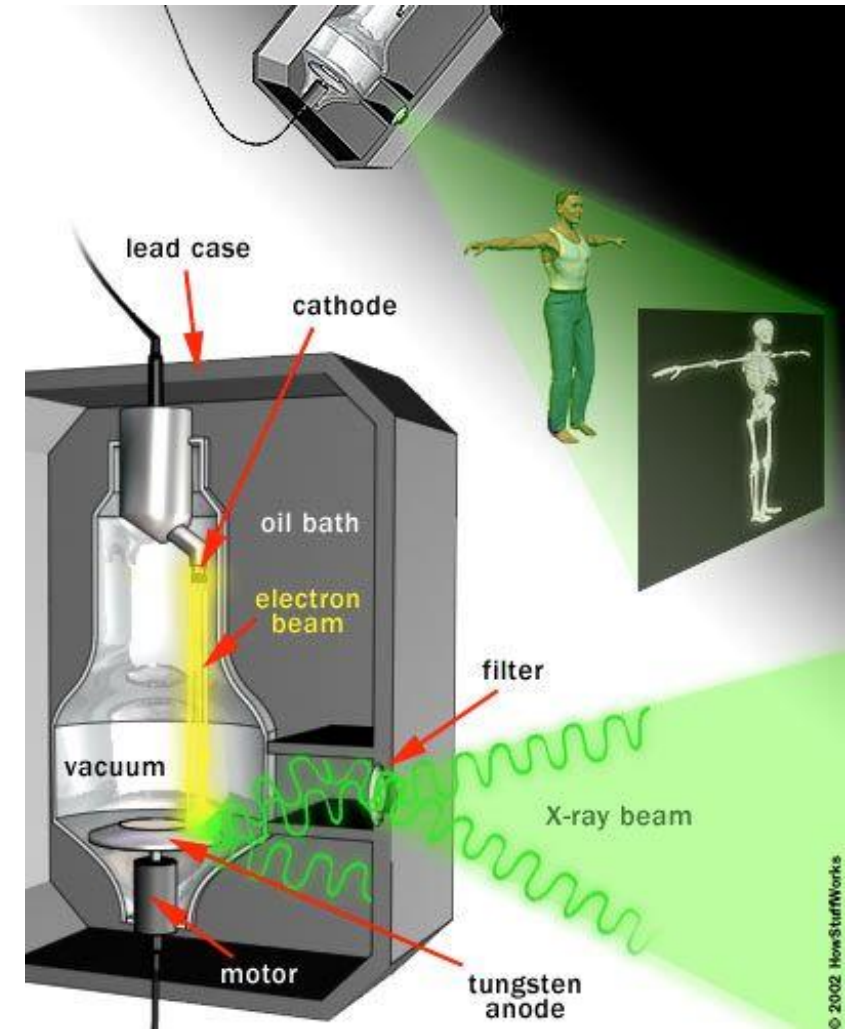
The diaphragm is a flat surface that vibrates in response to the sounds, which then travel through the tubing to the earpieces.





# How Does X-Ray Work?

To produce an X-ray picture, an X-ray machine produces a very concentrated beam of electrons known as X-ray photons. This beam travels through the air, comes into contact with our body tissues, and produces an image on a metal film.



# How Does MRI Work?

Magnetic resonance imaging is a no ionizing medical imaging test that produces detailed images of almost every internal structure in the human body.

A strong magnetic field created by the MRI scanner causes the atoms in your body to align in the same direction. Radio waves are then sent from the MRI machine and move these atoms out of the original position. As the radio waves are turned off, the atoms return to their original position and send back radio signals. These signals are received by a computer and converted into an image of the part of the body being examined. This image appears on a viewing monitor.

MIR tells the difference between types of soft tissues and between normal and abnormal soft tissues.



[Magnetic Resonance Imaging \(MRI\) \(nih.gov\)](https://www.nih.gov/health-topics/magnetic-resonance-imaging)  
[Magnetic Resonance Imaging \(MRI\) | Johns Hopkins Medicine](https://www.hopkinsmedicine.org/health-topics/magnetic-resonance-imaging)

# How Does Ultrasound Work?

The ultrasound machine transmits high-frequency (1 to 5 MHz) sound pulses into your body using a probe.

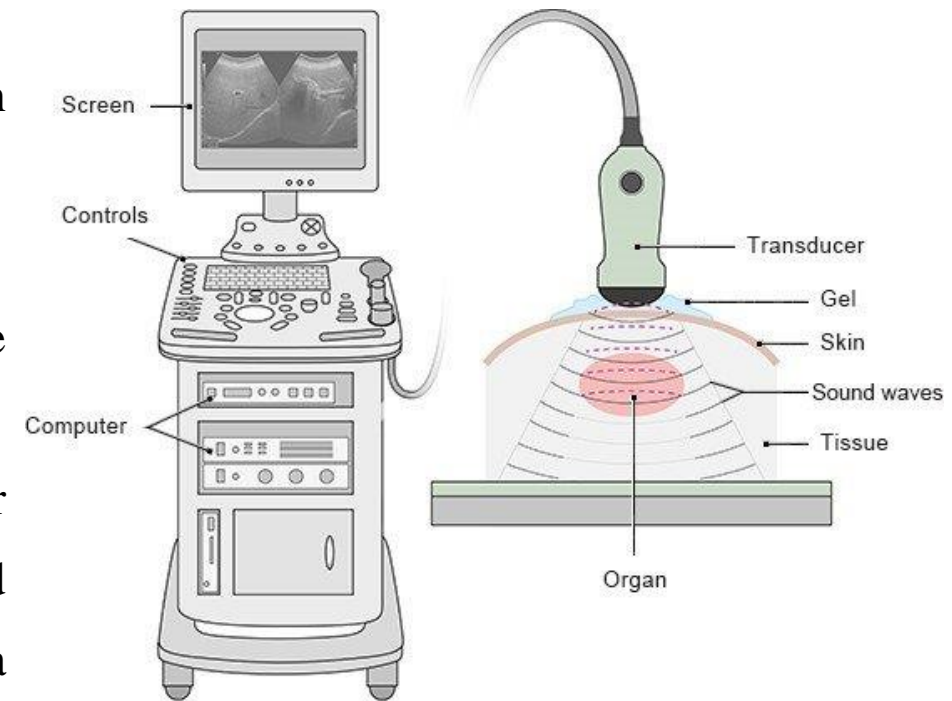
The sound waves travel into your body and hit a boundary between tissues (e.g. between fluid and soft tissue, soft tissue and bone).

The sound waves get reflected back to the probe.

The reflected waves are picked up by the probe and transmitted to the machine.

The machine calculates the distance from the probe to the tissue or organ (boundaries) using the speed of sound in tissue (1,540 m/s) and the time of each echo's return (usually on the order of millionths of a second).

The machine displays the distances and intensities of the echoes on the screen, forming a two-dimensional image.



# Mechanics for Running

A sportsman with prosthetic leg. Proud handicapped man.



# Fluids: Blood Circulation

## DEEP VEIN THROMBOSIS (DVT)

In normal conditions, in the arteries, blood circulates at a speed of 40 cm per second and in the smallest vessels: the capillaries, it circulates at 0.5 mm per second. BUT!!!



# DEEP VEIN THROMBOSIS (DVT)

A blood clot is referred to as a "thrombus," and a group of blood clots as "thrombi". **Deep vein thrombosis** is described by the medical term DVT. It is the development of one or more blood clots in a major veins of the body, usually in the lower extremities (such as the calf or lower leg).

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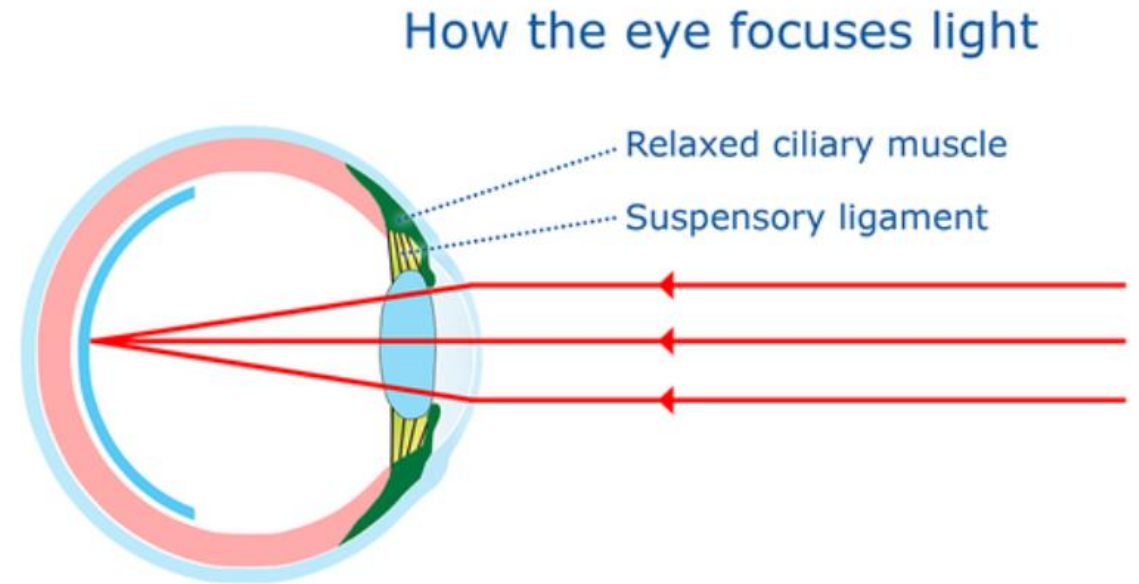
**Incidence, Types, Symptoms, Causes, Risk factors, Complications and Prevention**

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[deep-vein-thrombosis-dvt-symptoms-causes-types-complications-and-prevention](#)

# Optics

Like the lens in a camera, the basic function of the eye lens is to transmit and focus light onto the retina.



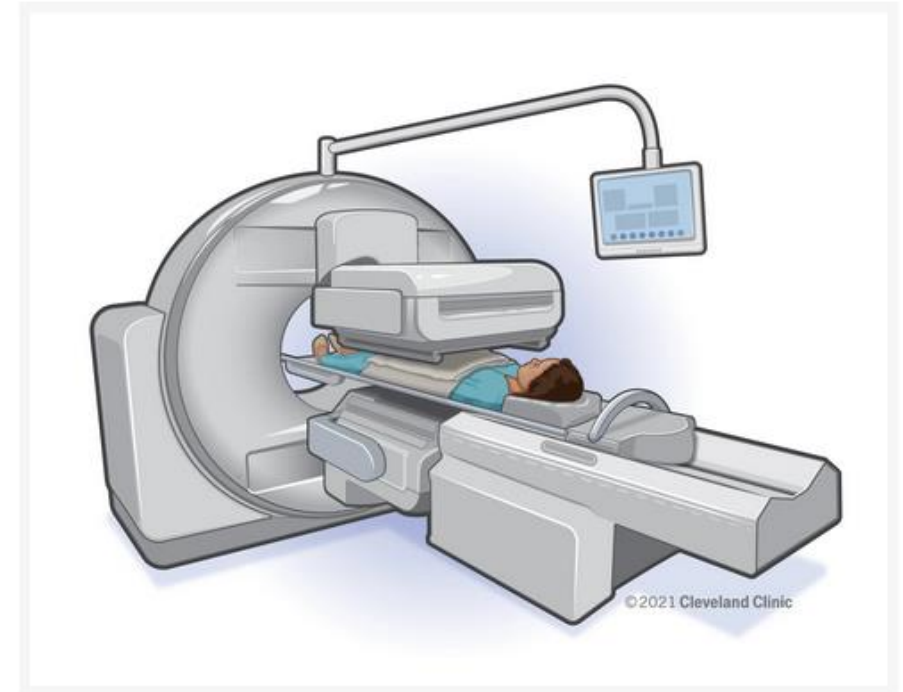
# Electricity

When a person's heart stops beating it may be necessary to deliver an electrical shock (called 'defibrillation') to the person's chest to restart their heart. In general, defibrillators can deliver shocks ranging from 200 to 1000 volts and currents of up to 30 amperes.



# Nuclear medicine

Nuclear medicine uses radioactive material inside the body to see how organs or tissue are functioning (for diagnosis) or to target and destroy damaged or diseased organs or tissue (for treatment).



A patient having a nuclear medicine imaging scan after administration of radioactive tracer material.



# What about you?

Do you know any medical physics device/principle or treatment/therapy?

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