Welcome to PHYS 101

Weekly Schedule:

Instructor:

Arif Özbay

arif.ozbay@istinye.edu.tr

Office Hours:

Thur. 10:30-12:00

V.411

Section 03:

Lectures: **Friday 11:00 – 13:30**

ANK.Z05

Ders Adı	Section	Derslik	Derslik Tipi	Öğretim Elemanı	YZ	Mufredat Sınıfı	Derslik Kapasitesi	Öğrenci Sayısı	Ders ID	Yarıyıl	Sinonim	Pazartesi	Salı	Çarşamba	Perşembe	Cuma
Physics 1	1	ANK-Z02	Sınıf	ARİF ÖZBAY		1	200	172	10248	1		11:50-14:20				
Physics 1	2	ANK-Z02	Sınıf	MUSTAFA SARISAMAN	*	1	200	167	10248	1			15:10-17:40			
Physics 1	3	ANK-Z05	Sınıf	ARİF ÖZBAY		1	200	167	10248	1						11:00-13:30
Physics 1	4	ANK-Z05	Sınıf	MUSTAFA SARISAMAN	*	1	200	173	10248	1			12:40-15:10			
Physics 1	91	V-104	Laboratuvar	STAFF 1		1	36	0	10248	1				11:50-13:30		
Physics 1	92	V-104	Laboratuvar	STAFF 1		1	36	0	10248	1						10:10-11:50
Physics 1	93	V-104	Laboratuvar	STAFF 1		1	36	0	10248	1			13:30-15:10			
Physics 1	94	V-104	Laboratuvar	STAFF 1		1	36	0	10248	1				08:30-10:10		
Physics 1	95	V-104	Laboratuvar	STAFF 1		1	36	0	10248	1			10:10-11:50			
Physics 1	96	V-104	Laboratuvar	STAFF 1		1	36	0	10248	1				10:10-11:50		
Physics 1	97	V-104	Laboratuvar	STAFF 1		1	36	0	10248	1		08:30-10:10				
Physics 1	98	V-104	Laboratuvar	STAFF 1		1	36	0	10248	1		14:20-16:00				
Physics 1	99	V-104	Laboratuvar	STAFF 1		1	36	0	10248	1						08:30-10:10

Physics 1 / PHYS 101

Kinematics
in 1, 2, and 3D

Dynamics
Newton's Laws of Motion

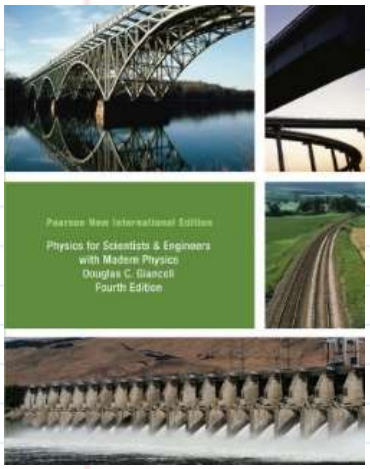
Work and Energy
Kinetic Energy, Work-Energy Principle

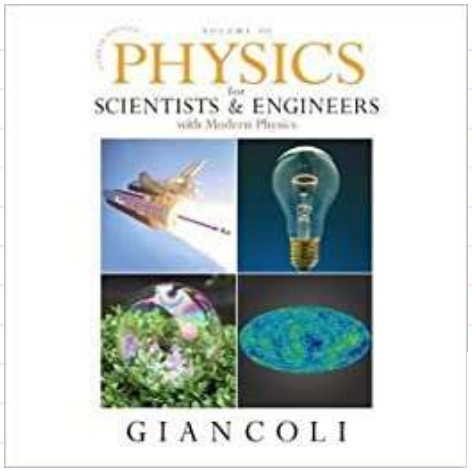
Conservation of Energy
Conservative Forces, Potential Energy, Energy Conservation

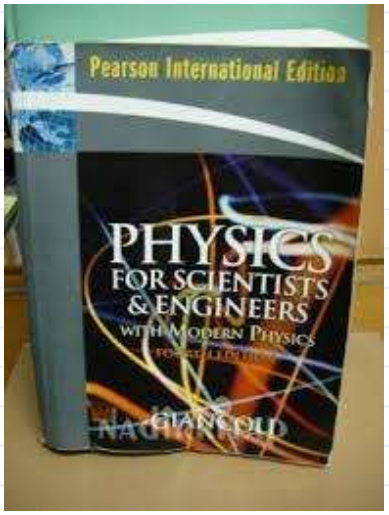
Linear Momentum
Linear Momentum, Impulse, Conservation of Momentum, Center of Mass

Rotational Motion
Rotational Kinematics, Dynamics, Rolling Motion

Textbook:


Pearson New International Edition
Physics for Scientists & Engineers
with Modern Physics
Douglas C. Giancoli
Fourth Edition


PHYSICS
for
SCIENTISTS & ENGINEERS
with Modern Physics
GIANCOLI


Pearson International Edition
PHYSICS
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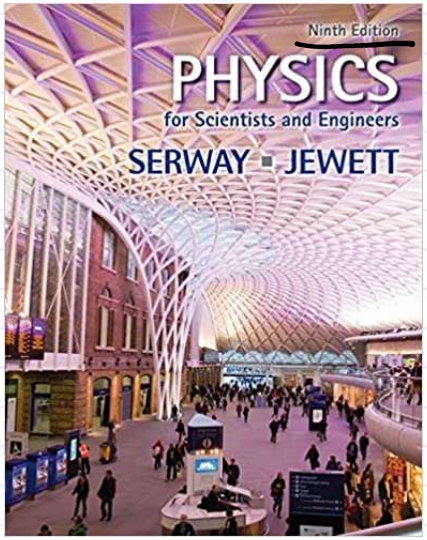
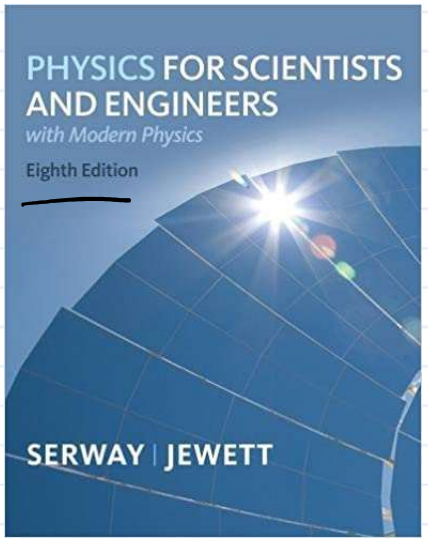

Ninth Edition
PHYSICS
for Scientists and Engineers
SERWAY • JEWETT


PHYSICS FOR SCIENTISTS
AND ENGINEERS
with Modern Physics
Eighth Edition
SERWAY | JEWETT

Tentative class schedule:

Week	Chapters (Giancoli)
1	Chp. 1 Introduction: Science, Units and Significant Figures
2	Chp. 2. & 3. Kinematics: Vectors, Kinematic Definitions, 1D, 2D and 3D motion
3	Chp. 2. & 3. Kinematics: Motion with constant acceleration, Free Fall
4	Chp. 2. & 3. Kinematics: Projectile Motion
5	Chp. 4 Dynamics: Newton's Laws of Motion
6	Chp. 5 Applications of Newton's Laws: Friction, Circular Motion
7	Chp. 5 Applications of Newton's Laws: Friction, Circular Motion
8	Exam Week
9	Chp. 7 Work and Energy
10	Chp. 8 Conservation of Energy
11	Chp. 9 Linear Momentum and Collisions
12	Chp. 9 Linear Momentum and Collisions
13	Chp. 10 Rotational Motion: Kinematics and Dynamics
14	Chp. 10 Rotational Motion: Dynamics, Rolling motion

Explore BlackBoard

Online Activities / Blackboard:

- Video solutions to selected problems (*not graded*),
- Online Quizzes (*graded*),
- Suggested problems and their solutions (*not graded*)

Grading:

Component	Weight
Online Quizzes	15%
~~Online Assignments: Data analysis, plots etc~~. LABS	15%
Midterm Exam	30%
Final Exam	40%
Total:	100%

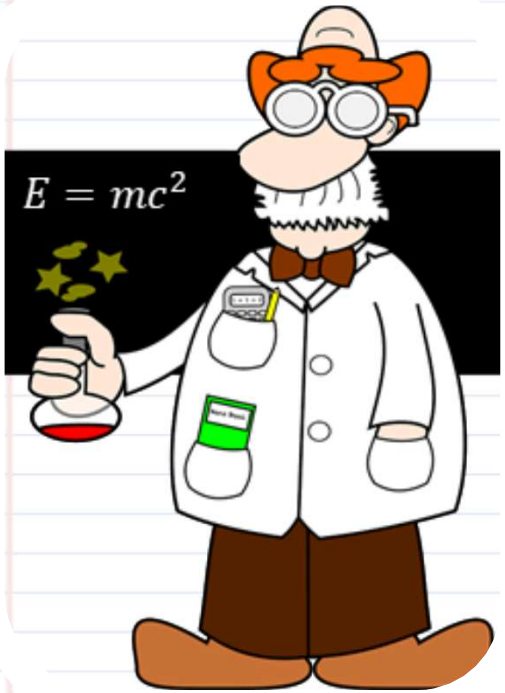
35 % to pass

Chapter 1

Introduction and Vectors

What is science?

Measurement / Observation



Dictionary

Search for a word

science

/ˈsʌɪəns/

Learn to pronounce

noun

the intellectual and practical activity encompassing the systematic study of the structure and behaviour of the physical and natural world through observation and experiment.
"the world of science and technology"

Similar: branch of knowledge | area of study | discipline | field

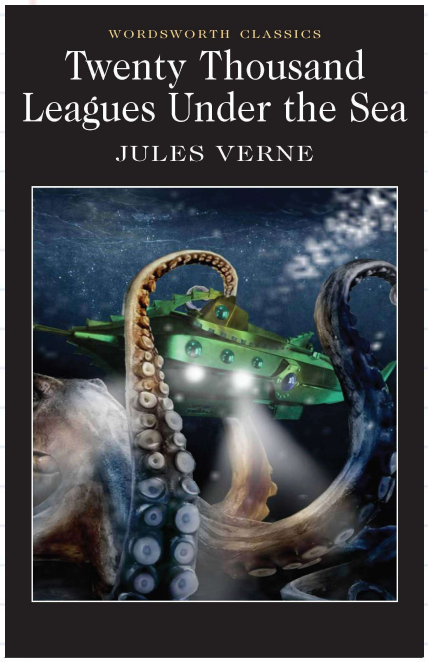
- a particular area of science.
  plural noun: sciences
  "veterinary science"
- a systematically organized body of knowledge on a particular subject.
  "the science of criminology"

Definitions from Oxford Languages | *Feedback*

Translations and more definitions

1.1 Measurement and Unit Systems

Measurement and Units

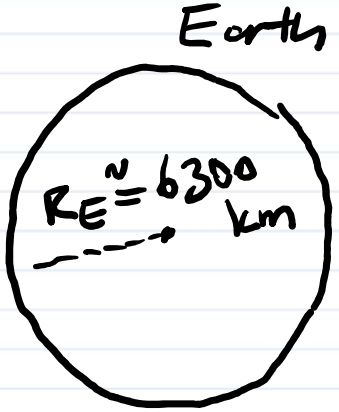


Length: meters, inches, league, mile, nautical miles, foot, **fersah,** merhale, endaze, kulaç, arşın …

Time: seconds, hour, year, minute, month, lunar month …

Mass : grams, kilograms, pound (mass), ounce (mass), carat, batman, oka …

20000 Leagues ≅ 100000 km



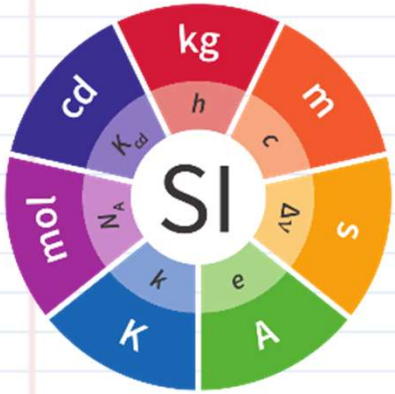
English-speaking world [edit] **(From Wikipedia)**

On land, the league is most commonly defined as three miles, though the length of a mile could vary from place to place and depending on the era. At sea, a league is three nautical miles (3.452 miles; 5.556 kilometres). English usage also included many of the other leagues mentioned below (for example, in discussing the Treaty of Tordesillas).

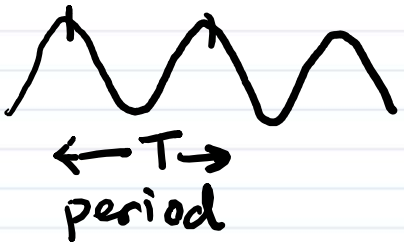
1.1 Measurement and Unit Systems

Standard Units (SI) System

$$1\,s = \frac{1}{\Delta\nu} \times 9192631770$$



Time: second (s): Cesium's radiation is used



$$f = \Delta\nu = \frac{1}{T} \Rightarrow T = \frac{1}{\Delta\nu}$$

$$f = 9\,192\,631\,770\ \text{Hz}$$

1 second is 9192631770 periods of this radiation

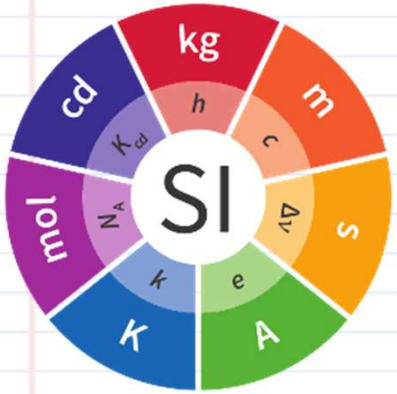
Length: meters (m) speed of light $c = 299\,792\,458\ m/s$

1 meter is the distance traveled by light in $\frac{1}{299792458}$ s.

$$1\,m = \frac{1}{\Delta\nu}\,\frac{9192631770}{299792458}\,c$$

1.1 Measurement and Unit Systems

Standard Units (SI) System



Mass: kilogram (kg) based on planck's constant h.

1.1 Measurement and Unit Systems

Base and Derived Quantities:

- Time — s
- Length — m
- Mass — kg
- Electric Current — A
- Temperature — K
- Amount of matter — mol
- Light Intensity — cd

} Base Quantities

DERIVED QUANTITIES

$$\text{velocity} = \frac{\text{Length}}{\text{Time}} \quad \text{m/s}$$

$$\text{acceleration} \equiv \frac{\text{velocity}}{\text{time}} = \frac{\text{Length}}{\text{Time}^2} \quad \text{m/s}^2$$

$$\text{force} \equiv \text{mass} \times \text{acceleration} \equiv \text{mass} \times \frac{\text{Length}}{\text{Time}^2} \quad \text{kg}\cdot\text{m/s}^2$$

$$F = ma$$

1.1 Measurement and Unit Systems

Dimensions and Dimensional Analysis:

Length [L]

Time [T]

Mass [M]

$$[\text{velocity}] = \frac{[L]}{[T]}$$

$$[\text{acceleration}] = \frac{[L]}{[T]^2}$$

$$[\text{Force}] = \frac{[M][L]}{[T]^2}$$

1.1 Measurement and Unit Systems

Dimensions and Dimensional Analysis:

$A = B + CD$

$[T]$ $[T]$ $\frac{[L]}{[M]}$ $\frac{[T][M]}{[L]}$

$\Delta x = v_{0x}t + \frac{1}{2}at^2$

$[L]$ $\frac{[L]}{[T]}[T]$ $\frac{[L]}{[T]^2}[T]^2$

$5^2 = 25$

$10^3 = 1000$

$e^4 =$

10^{2m} 5^{3kg} → powers must be dimensionless

Unit Conversion

What is $75\ mi/h$ in m/s?

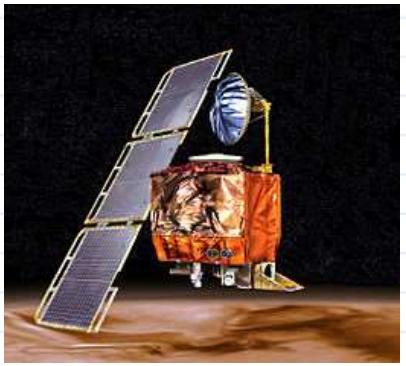
$1\ mi = 1.609\ km$
$1\ km = 1000\ m$
$1\ h = 60\ min$
$1\ min = 60\ s$

} Conversion factors

$$v = 75\ \frac{mi}{h}\left(\frac{1.609\ km}{1\ mi}\right)\left(\frac{1000\ m}{1\ km}\right)\left(\frac{1\ h}{60\ min}\right)\left(\frac{1\ min}{60\ s}\right)$$

$$v = 33.375\ m/s = 33.4\ m/s$$

Mars Orbiter Mission



Air Canada Incident

- https://en.wikipedia.org/wiki/Mars_Climate_Orbiter
- https://en.wikipedia.org/wiki/Gimli_Glider