The Hebrew University of Jerusalem

Syllabus

Mechanics for Bio-Med. Stud. - 77188

Last update 20-08-2019

HU Credits: 4

Degree/Cycle: 1st degree (Bachelor)

Responsible Department: Physics

Academic year: 0

Semester: 1st Semester

Teaching Languages: Hebrew

Campus: E. Safra

Course/Module Coordinator: Dr. Reuven Perel

Coordinator Email: perel@huji.ac.il

Coordinator Office Hours: By individual appointment

Teaching Staff:

Dr. Reuven Perel
Ms. Zoe Piran
Mr. Gilad Hirshfeld

Course/Module description:

This is an introductory course of mechanics. Main topics are: kinematics, dynamics, work and energy, momentum, hydrostatics, hydrodynamics, statics of a rigid body.

Course/Module aims:

Understanding the basic concepts and laws of mechanics will allow the students a better understanding of the physical world in general and of physical phenomena in medicine in particular. Students will be able to participate in the following semester's course dedicated to further topics of physics, such as electromagnetism and waves.

Learning outcomes - On successful completion of this module, students should be able to:

•Explain the basic concepts and laws of mechanics and be able to apply them.
•Participate in continuation courses in physics, e.g. electricity and waves, based on the knowledge acquired in this course.
•Explain the physical meaning of medical concepts, such as pressure.
•Perform in the future medical tasks that require understanding of the physics of the clinical phenomena, diagnostics or therapy.

Attendance requirements(%):

recommended, not required

Teaching arrangement and method of instruction: Lectures & tutorials

Course/Module Content:

•Introduction: Dimensions, units, scalars, vectors and algebra of vectors.
•Kinematics: Velocity and acceleration, motion along a straight line, motion in two/three dimensions, motion with constant acceleration, circular motion and relative motion.
•Dynamics: mass, force, Newton's laws, various forces, circular motion, harmonic oscillations, friction, and Newton's universal law of gravitation.
•Work & Energy: work, kinetic energy, conservative forces, potential energy, conservation of mechanical energy, general law of conversation of energy and power.

•*Systems of particle: momentum, impulse, internal forces, center of mass, conservation of momentum and collisions (elastic and inelastic) in one and two dimensions.*
•*Fluids: pressure, density; hydrostatics: Pascal's principle, Archimedes' principle; hydrodynamics: ideal fluid, continuity equation, Bernoulli's equation, viscosity and Poiseuille's law.*
•*Statics of a rigid body: torque, equilibrium and the requirements for equilibrium.*

Required Reading:
No required literature.
Recommended books are, inter alia:
1. Halliday ,Resnick, Walker, "Fundamentals of Physics".
2. Paul A. Tipler, "Physics for Scientists and Engineers".

Additional Reading Material:
None

Course/Module evaluation:
End of year written/oral examination 90 %
Presentation 0 %
Participation in Tutorials 0 %
Project work 0 %
Assignments 10 %
Reports 0 %
Research project 0 %
Quizzes 0 %
Other 0 %
mid exam

Additional information:
Weekly tutorial exercises have to be submitted.
Before the beginning of the course, it is recommended to refreshen the knowledge of calculus (derivatives and integrals) as required by the Israeli Mathematics "Bagrut", at the level of 3 units or more.