5 وحدات	عدد الساعات : 2 نظري 1 مناقشة	اسم المادة : الميكانيك التحليلي
---------	-------------------------------	---------------------------------

عدد الساعات	مفردات المادة
18	CH-1 Basic principles Vectors, frames rotation in Cartesian coordinate, velocity and acceleration components in different coordinate systems (polar, cylindrical spherical), some mathematical operation on vectors, gradient, divergence, curl.
15	CH-2 Motion of a particle in one dimension Force as a function of the velocity only, force as a function of time only, damping forces depending on the velocity, conservative force depending on position, and some applications.
15	CH-3 Motion of a particle two or three dimensions. Application to a set of forces acting on a particle, motion in more than one dimension, potential energy and conservative forces in two and three dimension, translational motion of coordinate systems.
12	CH-4 Central forces Gravitational field, potential energy in a central field, angular momentum, Kepler's laws, orbit of a body in a central field, energy of an orbit, motion in approximately circular motion, and some applications.
12	CH-5 Motion of a system of particles Conservation of linear momentum, center of mass, conservation of angular momentum, conservation of energy, motion of varying mass bodies, rocket motion, and collision problems (in C.M. and Lab. systems).

6	CH-6 Gravitation Centers of gravity for extended bodies, gravitational field and gravitational potential, gravitational field equation.
12	CH-7 Lagrange's equations and Hamiltonian functions Generalized coordinates, generalized forces, Lagrange's equation, generalized momentum, generalized forces in conservative systems, Lagrange equation for a particle, Lagrange equation for a general system, and some applications.

- **<u>References</u> 1.** Analytical Mechanics, Grant R.Fowles, 3<sup>rd</sup> edition.
- 2. Mechanics, Symon.
- Classical Mechanics, Atam P.Arya.
  Theoretical Mechanics, Murray R.Spiegel, Schaum's Series.