کراچی یونیورسٹی

University of Karachi

Department of Chemistry
Evening Program

Second Semester 2007-8

MATH 402 (S): Mechanics and Geometry II

Activity	Dates	Class Schedule
Teaching	January 11 – April 30	Friday 1730h – 1925h
Preparatory Leave for Examinations	May 1–7	Saturday 1730h – 1820h
Semester Examinations	May 8–28	*Office Hours*
Holidays	May 29 – July 15 (Summer)	Friday 1930h

Course Supervisor: **Professor Dr. Syed Arif Kamal**
Member AIAA (USA), IBRO (France)
MS (Indiana, Bloomington, USA); MA (Johns Hopkins, USA); PhD
Telephone: 926 1300-6 ext. 2380 (Tuesday, Thursday 1600h – 1700h)
Homepage: http://ngds-ku.org/kamal
For course announcements, assignments and past papers, go to *Pedagogical Section*, click on "Courses (offered during the current semester)"
e-mail: kamal(at the rate of)ngds-ku.org
Office: Room No. 6, Department of Mathematics, University of Karachi
Directions: http://www.ngds-ku.org/kamal/contact.htm#Directions

Course Objectives

To give the students sound background in the techniques & the methods of mechanics & geometry so that they can apply the ideas to different branches of science & engineering and develop an appreciation of its usefulness in their major subject (chemistry).

Course Outline

Section A – Dynamics I: Galilean-Newtonian principle, inertial frames, Galilean transformations, kinematics, motion with variable acceleration, simple-harmonic motion, methods of dynamics, principles of energy and momentum

Section B – Dynamics II: Motion of a projectile, orbital motion, moment of inertia, motion of a rigid body, impulsive motion, compound pendulum

Section C – Differential Geometry: Simple arc and curves in three dimensions and their parametric representation, the arc length, the natural parameterization, contacts (of order up to two) of curves and a surface, osculating plane, Franet trihedron and Franet formulae, curvature and torsion of a curve, surfaces in space, curvilinear coördinates, implicit equation of a surface, tangent plane, curves on surfaces and tangent vector, angle between curves on a surface, first and second fundamental forms on a surface

Section D – Calculus: Partial derivatives, geometrical meaning, equation of tangent plane and normal to surfaces, chain rule, approximation with the help of differentials, homogeneous functions, Euler's theorem, evaluation of simple, double and triple integrals, volume and surface areas of solids of revolutions

Recommended Reading

a) Anton H, *Calculus: A New Horizon* (6th edition), 1999, John Wiley, New York
b) Marion JB, *Classical Dynamics of Particles and Fields* (2nd edition), 1970, Academic Press, New York
c) Thomas GB, Finney AR, *Calculus* (10th edition), 2002, Addison-Wesley, Reading, Ma, USA
d) Spiegel MR, Vector Analysis, Schaum Outline Series