EGR 150 Syllabus

Physics

Lecture outline	Textbook location
Kinematics	
Introduction: particles and forces	
Introduction: problem solving	
Cartesian coordinates (1D)	
Position, position–time graph, displacement and distance, average velocity and speed	2.1
Instantaneous velocity and speed	2.2
Particle under constant velocity	2.3
Acceleration (average and instantaneous)	2.4
Position & velocity & acceleration – time graphs	
Particle under constant acceleration	2.6
Freely falling object	2.7
Laws of Motion	
Frame of reference	
Force	5.1
Newton's 1st Law of Motion; Inertial frame	5.2
Mass; heavy mass / inertial mass	5.3
Newton's 2nd Law of Motion	5.4
Gravitational force and weight	5.5
Newton's 3rd Law of Motion	5.6
Free-body diagram	5.6
Forces	
Gravitational force and weight	5.5
Normal force	5.6
Tension	5.7
Friction; static, kinetic	5.8
Resistive forces;$\propto v$, $\propto v^2$ (air drag)	6.4

Lecture outline	Textbook location
Momentum	
Propulsion	9.9
Momentum	9.1
Conservation of momentum	9.2
Rocket equation	9.9
Fluid mechanics	
Pressure	14.1
Pascal's Law	14.2
Buoyant forces and Archimedes' principle	14.4
Systems	
Isolated / non-isolated systems	7.1
Energy	
Work	7.2
Ideal spring; Hooke's law	7.4
Kinetic energy	7.5
Potential energy: gravitational, elastic	7.6
Conservation of energy in isolated systems	8.2
Collisions; elastic, inelastic	9.4

Math

Lecture outline	Textbook location
Review on Data & graphs & functions & models	
Functions	1.1
Algebra with functions and composite functions	1.2
Shifting, scaling, reflecting graphs	1.2
Exercises: how to turn experimental data or physical concepts into graphs and functions	
Limit values	
Definition of limit values	2.1 & 2.3
How to find limit values	2.2
Continuity	2.5
Limits of polynomials, rational functions	2.2
Derivatives	
Rate of change	2.1 & 3.4
Tangent lines	2.1 & 3.1
Derivative as function	3.2
Examples of derivatives; rules for differentiation	3.3 & 3.6
Differential equation (e.g. rocket equation)	9.9 (Physics book)
Applications of derivatives	
Extreme values	4.1
Mean value theorem	4.2
Applied optimization	4.6
Fermat's principle	4.6
Scalar vector product	7.3 (Physics book)

Schedule

Classes start Tuesday 7/10

Lectures:
7/10, 12, 13
7/17, 19
7/24, 27
7/31, 8/ 3
8/7, 10
8/14, 16, 17

Labs:
7/16, 20
7/23, 26
7/30, 8/2
8/6 – Rocket launch date, weather permitting; back-up: 8/9
8/9
8/13

Quiz I:
30 minutes at beginning of lecture on July 24;
open book, open notes; no collaboration

Quiz II:
30 minutes at beginning of lecture on August 7;
closed book, closed notes; but: 1 letter size-sheet with notes front and back is allowed;
no collaboration

Final exam:
August 21; 9 a.m. – 12 noon
closed book, closed notes; no collaboration
1 letter size-sheet with notes front and back is allowed;

Grade composition for EGR 150

Lab-participation	25%
Lab-report	10%
Homework	25%
Quizzes	10%
Written final	30%