بســم الله الرّحمن الرّحيـــم

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PHYSICS DEPARTMENT GENERAL PHYSICS - I

FALL SEMESTER (2013 – 2014) MECHANICS (0302101)

**Recommended Textbook:**

**"**Physics For Scientists and Engineers with Modern Physics**"**

Raymond A. Serway and John W. Jewett Jr., 8th edition, (Thomson Learning, Belmont, CA, USA, 2010).

**Recommended References:**

1. F. Sears, M. Zemansky’s **“University Physics with Modern Physics"**, 13th Edition (Pearson, Addison Wesley, 2012).

1. David Halliday, Robert Resnick, and Jearl Walker, **"EXTENDED PRINCPLES OF PHYSICS",** 9th Edition (John Wiley & Sons, Inc., 2011).
2. Bauer Westfall, **“University Physics with Modern Physics”,** (McGraw Hill, 2011).
3. James S. Walker, **“Physics”** Fourth Edition, (Addison – Wesley, 2010).
4. Giancoli, **“Physics for Scientists & Engineers with Modern Physics”,** Fourth Edition, (Pearson Education, 2009).
5. Ohanian and Market, **“Physics for Engineers and Scientists”**, Extended Third Edition, (W. W. Norton & Company, 2007).

**المحاضرون:** أعضاء هيئة تدريس.

**المنسق: الدكتور زياد أبو وعر.**

Course Content:

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| **Chapter** | **Content** | **Suggested Problems** |
| **2** | **Motion in One Dimension (4 Lectures)**2.1 Position, Velocity, and Speed 2.2 Instantaneous Velocity and Speed 2.4 Acceleration 2.5 Motion Diagrams 2.6 Analysis-Model: Particle Under Constant Acceleration 2.7 Freely Falling Objects 2.8 Kinematic Equations Derived from Calculus  | 1, 3, 4, 16, 17, 24, 28, 45 |
| **3** | **Vectors (3 Lectures)**3.1 Coordinate Systems 3.2 Vector and Scalar Quantities 3.3 Some Properties of Vectors 3.4 Components of a Vector and Unit Vectors 7.3 The Scalar Product of Two Vectors 11.1 The Vector Product and Torque  | 3.4, 3.31, 3.327.11, 7.12, 7.15, 11.1, 11.2, 11.10 |
| **4** | **Motion in Two Dimensions (4 Lectures)**4.1 The Position, Velocity, and Acceleration Vectors 4.2 Two-Dimensional Motion with Constant Acceleration 4.3 Projectile Motion 4.4 Uniform Circular Motion 4.5 Tangential and Radial Acceleration  | 1, 6, 14, 25, 32 |
| **5** | **The Laws of Motion** **(4 Lectures)**5.1 The Concept of Force 5.2 Newton's First Law and Inertial Frames 5.3 Mass 5.4 Newton's Second Law 5.5 The Gravitational Force and Weight 5.6 Newton's Third Law 5.7 Analysis Models Using Newton's Second Law 5.8 Forces of Friction  | 3, 12, 13, 22, 27, 38, 41, 47 |
| **6** | **Circular Motion and Other Applications of** **Newton's Laws (2 Lectures)**6.1 Extending the Particle in Uniform Circular Motion Model 6.2 Non-uniform Circular Motion  | 1, 11, 13, 16, 54, 57 |
| **7** | **Energy of a System (3 Lectures)**7.1 Systems and Environments 7.2 Work Done by a Constant Force 7.4 Work Done by a Varying Force 7.5 Kinetic Energy and the Work-Kinetic Energy Theorem 7.6 Potential Energy of a System 7.7 Conservative and Non-Conservative forces 7.8 Relationship Between Conservative Forces and Potential Energy  | 1, 15, 17, 25, 43, 49 |
| **8** | **Conservation** **of Energy (3 Lectures)**8.1 Analysis Model: Non-isolated System (Energy) 8.2 Analysis Model: Isolated System (Energy) 8.3 Situations Involving Kinetic friction 8.4 Changes in Mechanical Energy for Non-Conservative Forces 8.5 power  | 5, 6, 7, 22, 23, 63 |
| **9** | **Linear Momentum and Collisions (4 Lectures)**9.1 Linear Momentum 9.2 Analysis Model: Isolated System (Momentum) 9.3 Analysis Model: Non-Isolated System (Momentum) 9.4 Collisions in One Dimension9.5 Collisions in Two Dimensions 9.6 The Center of Mass  *(No Integrals)* | 9, 11, 26, 27, 36, 37, 38, 41, 55 |
| **10** | **Rotation of a Rigid Object about a Fixed Axis (5 Lectures)**10.1 Angular Position, Velocity, and Acceleration 10.2 Analysis Model: Rigid Object Under Constant Angular Acceleration 10.3 Angular and Translational Quantities 10.4 Rotational Kinetic Energy 10.6 Torque 10.7 Analysis Model: Rigid Object Under a Net Torque 10.8 Energy Considerations in Rotational Motion  | 3, 8, 11, 15, 25, 26, 35, 38, 40, 71 |
| **11** | **Angular Momentum (3 Lectures)**11.2 Analysis Model: Non-Isolated system (Angular Momentum) 11.3 Angular Momentum of a Rotating Rigid Object 11.4 Analysis Model: Isolated system (Angular Momentum)  | 11, 12, 18, 27, 45 |
| **12** | **Static Equilibrium and Elasticity (3 Lectures)**12.1 Analysis Model: Rigid Object in Equilibrium 12.2 More on the Center of Gravity 12.3 Examples of Rigid Objects in Static Equilibrium 12.4 Elastic Properties of Solids ***(Self Reading)*** | 2, 3, 4, 8, 23  |
| **13** | **Universal Gravitation (2 Lectures)**13.1 Newton’s Law of Universal Gravitation 13.2 Free-Fall Acceleration and the Gravitational Force  | 3, 6, 10, 12 |
| **14** | **Fluid Mechanics (4 Lectures)**14.1 Pressure 14.2 Variation of Pressure with Depth 14.4 Buoyant Forces and Archimedes’s Principle 14.5 Fluid Dynamics 14.6 Bernoulli’s Equation  | 1, 5, 8, 25, 27, 39 |
| **15** | **Oscillatory Motion  *(Self Reading)***15.1 Motion of an Object Attached to a Spring 15.2 Analysis Model: Particle in a Simple Harmonic Motion 15.3 Energy of the Simple Harmonic Oscillator 15.4 Comparing Simple Harmonic Motion with Uniform Circular Motion 15.5The Pendulum  | 1, 3, 8, 9, 14, 21, 25, 52 |

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| **Exams** | **Weight %** | **Tentative Date** | **Number of Questions** | **Chapters** |
| **1st** | 20 | Thursday, 7-11- 2013 (3 pm) | 10 | 2, 3, 4, Vector Products, 5, 6  |
| **2nd** | 30 | Tuesday, 10-12- 2013 (3 pm) | ~ )12 – 15( | 7, 8, 9, 10, 11 |
| **Final** | 50 | Wednesday, 8-1- 2014 | ~ )17 – 25( | **All material included**. |

**Note**: All exams are multiple choice.