

# Week 1: Thinking like a physicist and 1D Kinematics

In this first week, we will watch Walter Lewin's lectures 00 through 03; these lectures are complemented by reading Chapters 1,3, and 2 in the OpenStax University Physics (vol. 1) textbook.

## Class 1: 01 Sept: Introduction

Before Class:

*LECTURES TO WATCH:*

Lecture 00: (3 min) <https://youtu.be/wWnfJ0-xXRE>

Lecture 01: (38 min) <https://youtu.be/GtOGurrUPmQ>

*CHAPTERS TO READ & HOMEWORK PROBLEMS FROM UNIV. PHYSICS VOL. 1*

Chapter 1: Ch1: 17, 31, 37, 57, 80, 87

## Class 2: 03 Sept - 1D Kinematics

Before Class:

*LECTURES TO WATCH:*

1. Lecture 02: (51 min) [https://youtu.be/q9IW0Q199\\_o](https://youtu.be/q9IW0Q199_o)

*CHAPTERS TO READ & HOMEWORK PROBLEMS FROM UNIV. PHYSICS VOL. 1*

Chapter 3: Ch3: 5, 11, 12, 19, 27, 31, 32, 43, 45, 47, 49, 72, 89, 101

## Class 3: 04 Sept - Vectors

Before Class:

*LECTURES TO WATCH:*

Lecture 03: (49 min) [https://youtu.be/0na1JdPE\\_JY](https://youtu.be/0na1JdPE_JY)

*CHAPTERS TO READ & HOMEWORK PROBLEMS FROM UNIV. PHYSICS VOL. 1*

Chapter 2: Ch2: 5, 13, 14, 28, 36, 37, 43, 49, 64, 67, 86

# Week 2: 2 & 3D Kinematics, Circular motion

This week we will watch Walter Lewin's lectures 04 and 05; these lectures are complemented by reading

Chapter 4 in the OpenStax University Physics (vol. 1) textbook.

### **Class 4: 08 Sep - 2D and 3D Kinematics**

Before Class:

LECTURES TO WATCH:

Lecture 04: (52 min) <https://youtu.be/k6aJyOHTDYM>

*CHAPTERS TO READ & HOMEWORK PROBLEMS FROM UNIV PHYSICS VOL. 1*

Chapter 4: Ch4: 1, 5, 15, 19, 31, 33, 36, 37, 45, 48, 97

### **Class 5: 10 Sep - Circular Motion, Centripetal Forces, Perceived Gravity**

*LECTURES TO WATCH:*

Lecture 05: (51 min) <https://youtu.be/mWj1ZEQT18I>

*CHAPTERS TO READ & HOMEWORK PROBLEMS FROM UNIV PHYSICS VOL. 1*

Chapter 4: Ch4: 61, 63, 67, 73, 83, 87

### **Class 6: 11 Sep - Two week review**

Problems: Ch. 2: 91, Ch. 3: 111, Ch4: 101

## **Quiz 1: 11 Friday --- 50 points**

### **Week 3: Newton's Laws, Weight, Friction**

#### **Class 7: 15 Sep - Newton's Laws**

Before Class:

LECTURES TO WATCH:

Lecture 06: (49 min) <https://youtu.be/oduZsA0Tk58>

*CHAPTERS TO READ & HOMEWORK PROBLEMS FROM UNIV. PHYSICS VOL. 1*

Chapter 5: Ch5: 2, 5, 7, 11, 19, 29, 31, 37

#### **Class 8: 17 Sep - Newton's Laws, Weight**

Before Class:

LECTURES TO WATCH:

Lecture 07: (50 min) <https://youtu.be/Z07tTuE1mwk>

CHAPTERS TO READ & HOMEWORK PROBLEMS FROM UNIVERSITY PHYSICS VOL. 1

Chapter 5: Ch5: 41, 45, 63, 67, 71

## **Class 9: 18 Sep - More Newton's Laws & Friction**

Before Class:

LECTURES TO WATCH:

Lecture 08: (49 min) <https://youtu.be/FWh-enOdXM4>

CHAPTERS TO READ & HOMEWORK PROBLEMS FROM UNIVERSITY PHYSICS VOL. 1

Chapter 6.1-6.3: Ch6: 17, 25, 39, 43, 45, 53, 63, 73, 95, 109, 126

## **Week 4: SHM; Work, Kinetic & Potential Energy, Dissipative Forces**

### **Class 10: 22 Sep - Review for Exam 1**

Before Class:

LECTURES TO WATCH:

Lecture 09: (49 min) <https://youtu.be/pjsV9Ccqhi4>

CHAPTERS TO READ & HOMEWORK PROBLEMS FROM UNIVERSITY PHYSICS VOL. 1

Review all content from Ch1 through Ch6, and finish HW.

## **EXAM 1: Wednesday 23 September 2020**

### **Class 11: 24 Sept**

Go over Exam 2

### **Class 12: 25 Sept -- Springs, Pendulums**

Before Class:

LECTURES TO WATCH:

Lecture 10: (48 min) <https://youtu.be/tNpuTx7UQbw>

## CHAPTERS TO READ & HOMEWORK PROBLEMS FROM UNIVERSITY PHYSICS VOL. 1

Chapter 15 (1-4): Ch15: 1, 3, 21, 22, 29, 43, 60, 61, 73

### **Week 5: Drag forces, Energy Conservation in SHM**

#### **Class 13: 29 Sep - Work, Energy**

Before Class:

LECTURES TO WATCH:

Lecture 11: (49 min) <https://youtu.be/9gUdDM6LZGo>

## CHAPTERS TO READ & HOMEWORK PROBLEMS FROM UNIVERSITY PHYSICS VOL. 1

Chapter 7 : Ch7 : 3, 23, 28, 37, 44, 49, 54, 55, 56, 64, 69, 93

Chapter 8 : Ch8 : 25, 26, 31, 42, 68, 71, 74, 75

Chapter 13 (1-3): Ch13: 13, 18, 21

#### **Class 14: 1 Oct - Energy conservation in SHM**

Before Class:

LECTURES TO WATCH:

Lecture 13: (53 min) <https://youtu.be/9ta5ul9x6WE>

## CHAPTERS TO READ & HOMEWORK PROBLEMS FROM UNIVERSITY PHYSICS VOL. 1

Chapter 15: Ch15: 57, 60, 69

#### **Class 15: 2 Oct - Review Session**

Before Class:

Catch up on all homework

## **QUIZ #2 Friday 2 October: 50 points**

### **Week 6: Escape Velocity, Power, Momentum, Collisions, Rockets**

#### **Class 16: Tue 6 Oct -Escape Velocity**

Before Class:

LECTURES TO WATCH:

Lecture 14: (49 min) <https://youtu.be/3fTVn96gUSQ>

CHAPTERS TO READ & HOMEWORK PROBLEMS FROM UNIVERSITY PHYSICS VOL. 1

Chapter 13 (1-4): Ch13: 13, 18, 21, 29, 33, 34

### **Class 17: The 8 Oct -- Power, Momentum, Center of Mass, Inelastic Collisions**

Lecture 15: (52 min) [https://youtu.be/alhScO3\\_I50](https://youtu.be/alhScO3_I50)

CHAPTERS TO READ & HOMEWORK PROBLEMS FROM UNIVERSITY PHYSICS VOL. 1

Chapter 9 : Ch 9 : 1, 20, 25, 27, 31, 33, 35, 37

### **Class 18: Fri 9 Oct --Elastic Collisions**

Before Class:

LECTURES TO WATCH:

Lecture 16: (48 min) <https://youtu.be/-q-WiX-KVXo>

CHAPTERS TO READ & HOMEWORK PROBLEMS FROM UNIVERSITY PHYSICS VOL. 1

Chapter 9 : Ch9 : 43, 46, 47, 62, 63, 72, 75

## **Week 7: Impulse, Rockets**

### **Class 19: Tue 13 Oct -Impulse, Rockets**

Before Class:

LECTURES TO WATCH:

Lecture 17: (49 min) [https://youtu.be/BBYLiF\\_R0Xs](https://youtu.be/BBYLiF_R0Xs)

CHAPTERS TO READ & HOMEWORK PROBLEMS FROM UNIVERSITY PHYSICS VOL. 1

Chapter 9: 73, 77, 78,79, 97

### **Class 20: Th 15 Oct - Review for Exam 2**

LECTURES TO WATCH:

Lecture 18: (49 min) <https://youtu.be/DcbIYQPTMj0>

### **Class 21: Fri 16 Oct - Exam 2**

second day of review!

# EXAM 2: Friday 16 Oct 2020

## Week 8: Rotational Kinematics and Dynamics

### Class 22: Tue 20 Oct - Rotational motion, moment of inertia, rotational KE

Before Class:

LECTURES TO WATCH:

Lecture 19: (41 min) [https://youtu.be/fDJeVR0o\\_w](https://youtu.be/fDJeVR0o_w)

CHAPTERS TO READ & HOMEWORK PROBLEMS FROM UNIVERSITY PHYSICS VOL. 1

Chapter 10: Ch10: 28, 29, 32, 37, 39, 43, 47, 55, 61, 63

### Class 23: Thu 22 Oct - Angular momentum, torque

Lecture 20: (51 min) <https://youtu.be/sNaaL19opxw>

CHAPTERS TO READ & HOMEWORK PROBLEMS FROM UNIVERSITY PHYSICS VOL. 1

Chapter 11(1-3): Ch11: 19, 21, 23, 26, 34, 39, 49, 52\*, 56, 58

### Class 24: - Fri 23 Oct -- More Angular momentum and torque & physical pendulums

Before Class:

LECTURES TO WATCH:

Lecture 21: (48 min) <https://youtu.be/4Mw6oD1MnKg>

CHAPTERS TO READ & HOMEWORK PROBLEMS FROM UNIVERSITY PHYSICS VOL. 1

Chapter 10: Ch10: 65, 66, 69, 71, 77, 79, 81, 93, 101

Chapter 11: Ch11 : 6, 11, 86, 97

## Week 9: Rolling motion, Gyroscopes, Orbits, Static Equilibrium

### Class 25: - Tue 27 Oct -- Rolling motion and Review of Rotational kinematics and dynamics

Before Class:

LECTURES TO WATCH:

Lect 24 - [https://youtu.be/XPUuF\\_dECVI](https://youtu.be/XPUuF_dECVI)

## **Class 26: - Thu 29 Oct -- Elliptical Orbit, Kepler's Laws**

Before Class:

LECTURES TO WATCH:

Lecture 22: (49 min) <https://youtu.be/9wDAm-dlht4>

CHAPTERS TO READ & HOMEWORK PROBLEMS FROM UNIVERSITY PHYSICS VOL. 1

Chapter 13 (4,5) : Ch13: 47, 49, 51

## **Class 27: Fri 30 Oct-Static Equilibrium**

Before Class:

LECTURES TO WATCH:

Lecture 25: (48 min) [https://youtu.be/0NegJkO\\_ZM4](https://youtu.be/0NegJkO_ZM4)

CHAPTERS TO READ & HOMEWORK PROBLEMS FROM UNIVERSITY PHYSICS VOL. 1

Chapter 12: Ch12: 15, 25, 26, 27, 33, 38, 75

# **Quiz #3 Friday, Oct 30 50 points**

## **Week 10: Elasticity, Physical Pendulums, Fluid Mechanics**

### **Class 28: Tue 3 Nov-Elasticity**

Before Class:

LECTURES TO WATCH:

Lecture 26: (50 min) <https://youtu.be/ifri4c0luz8>

CHAPTERS TO READ & HOMEWORK PROBLEMS FROM UNIVERSITY PHYSICS VOL. 1

Chapter 12.3, 12.4: Ch12: 47, 53, 59, 68

### **Class 29: Thu 5 Nov-Physical Pendulums**

Before Class:

LECTURES TO WATCH:

Lecture 30: (49 min). <https://youtu.be/hAYeA3Wwb4U>

CHAPTERS TO READ & HOMEWORK PROBLEMS FROM UNIVERSITY PHYSICS VOL. 1

Chapter 10: Ch10: 115; plus the following: compute the period of small oscillations for this pendulum.

## **Class 30: Fri 6 Nov- Fluid Mechanics**

Before Class:

LECTURES TO WATCH:

Lecture 27: (50 min). [https://youtu.be/O\\_HQklhIlwQ](https://youtu.be/O_HQklhIlwQ)

CHAPTERS TO READ & HOMEWORK PROBLEMS FROM UNIVERSITY PHYSICS VOL. 1

Chapter 14 (1-4): Ch14: 4, 9, 11, 18, 55, 61, 65, 73

## **Week 11: More Fluid mechanics**

### **Class 31: Tue 10 Nov-Hydrostatics, Archimedes' Principle, Bernoulli's Eq**

Before Class:

LECTURES TO WATCH:

Lecture 28: (48 min) <https://youtu.be/JR-L2CS8DGc>

CHAPTERS TO READ & HOMEWORK PROBLEMS FROM UNIVERSITY PHYSICS VOL. 1

Chapter 14 (5-7): Ch14: 23, 25, 81, 89

### **Class 32: Thu 12 Nov- Review for Exam 3**

Before Class:

LECTURES TO WATCH:

Lecture 29: (48 min). <https://youtu.be/vNXBJLV4Ga4>

CHAPTERS TO READ & HOMEWORK PROBLEMS FROM UNIVERSITY PHYSICS VOL. 1

### **Class 33: Fri 13 Nov- Exam 3**

CHAPTERS TO READ & HOMEWORK PROBLEMS FROM UNIVERSITY PHYSICS VOL. 1

WORK OUT EXAM REVIEW PROBLEMS (TO BE ASSIGNED)

## **Exam 3: Friday 13 November**

## **Week 12: Heat, Thermal Expansion, Calorimetry**

### **Class 34: Tue 17 Nov Heat, Thermal expansion**

Before Class:



LECTURES TO WATCH:

Lecture 32: (49 min) <https://youtu.be/mAAvp5YzWxk>

CHAPTERS TO READ & HOMEWORK PROBLEMS FROM [UNIVERSITY PHYSICS VOL. 2](#)

Volume 2: Chapter 1 : Ch1: TBA

### **Class 35: Thu 19 Nov Specific heat, phase changes, calorimetry**

Before Class:

LECTURES TO WATCH:

Lecture 33: (49 min) <https://youtu.be/husWiBtkROQ>

CHAPTERS TO READ & HOMEWORK PROBLEMS FROM [UNIVERSITY PHYSICS VOL. 2](#)

Volume 2: Chapter 1 : Ch1: TBA

### **Class 36: Fri 20 Nov Periodic Phenomena, SHO, Complex Notation, Physical Pendulums**

Before Class:

LECTURES TO WATCH:

8.03 Lecture 01: (49 min) [https://youtu.be/VuX\\_UExHa0M](https://youtu.be/VuX_UExHa0M)

Problem Set TBA

### **Week 13: Thanksgiving week. All Week break.**

### **Week 14: (Online)**

Lecture/discussion TBA

## **4 Dec 2020: QUIZ 4 (50 points)**

### **Week 15: (Online)**

Lecture/Discussion TBA

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