



## National Taiwan University of Science and Technology

### 2020 Summer Program

### PHY 101 Introduction to Physics with Lab

### Course Outline

**Term:** June 22-July 17, 2020

**Class Hours:** 13:00-15:30 (Monday through Friday)

**Course Code:** PHY 101

**Instructor:** Jordan Morelli, Ph.D., P.Eng.

**Home Institution:** Queen's University at Kingston

**Office Hours:** TBA and by appointment

**Email:** [morelli@queensu.ca](mailto:morelli@queensu.ca)

**Credit:** 4

**Class Hours:** This course will have 72 class hours, including 40 lecture hours, 10 lecturer office hours, 10-hour TA discussion sessions, 2-hour review sessions, 10-hour extra classes.

**Course Description:** This course provides an introduction to physics through the exploration of classical mechanics. Topics include: linear and angular kinematics, kinetics, forces, linear momentum, work and energy, angular momentum, and the conservation laws.

**Textbook:** The textbook that will be used is "University Physics with Modern Physics" by Young and Freedman, 14<sup>th</sup> Edition.

#### **Grading and Evaluation:**

Homework Assignments: 20%

In-Class Quizzes: 14%

Labs: 16%

Midterm Exam: 20%

Final Exam: 30%



There will be one homework assignment due at the start of class every Tuesday through Friday except on the days with the midterm examination and the final examination. Each assignment will take you about ninety minutes to complete. Your two lowest homework marks will be dropped in calculating your final grade.

Each lecture class will include a number of short quizzes throughout the period.

Each student is required to have a bound laboratory notebook for use in the laboratory. Each laboratory period will include a number of short questions that must be answered in your laboratory notebook for grading at the beginning of the next class session.

Course work throughout the term will be assessed using percentage grades, but the final course grade will be converted to a letter grade according to the following scale: A (94%-100%), A- (90%-93%), B+ (87%-89%), B (84%-86%), B- (80%-83%), C+ (77%-79%), D (60%-69%), and F (59% and below). Note: most colleges and universities do not award transfer credit for grades of D or F.

**Attendance:** Attendance at every class session is mandatory.

### **Course Schedule:**

#### Week 1:

Lecture 1: Course Introduction, Introduction to Kinematics, Review of Vectors

Lecture 2: Projectile Motion

Lecture 3: Uniform Circular Motion

Lecture 4: Rotational Variables and Equations of Motion

Lab 1: Projectile Motion

#### Week 2:

Lecture 5: Relative Motion

Lecture 6: Forces and Newton's Laws, Examples involving Friction and Circular Motion



Lecture 7: Work and Kinetic Energy, Examples involving Work by Springs and Gravity

Lecture 8: Potential Energy, Conservation of Energy, and Power

Lab 2: Conservation of Energy

Week 3:

Lecture 9: Centre of Mass, and Linear Momentum

Lecture 10: Conservation of Linear Momentum, Examples involving collision and explosions

**Midterm Examination**

Lecture 11: Rolling Motion (with and without slipping)

Lab 3: Centre of Mass

Week 4:

Lecture 12: Rotational Kinetic Energy, and Moments of Inertia

Lecture 13: Torque, Work and Power by External Torques, and Angular Momentum

Lecture 14: Static Equilibrium

Lab 4: Rotational Motion

**Final Examination**