



# MOUNT NOTRE DAME

*Empowering Young Women*

## Mount Notre Dame High School Physics Summer Assignment

Welcome to Physics at MND!

We are excited that you have decided to take physics next year! No matter what your final career or your academic goals, this course will help you develop your critical thinking, logic and mathematical skills. You will also develop hands-on skills with hardware that you are very likely to use again in college.

This physics course is a survey course which will introduce you to all the major fields within physics. There is an incredible amount of content and a very short time to complete the work. We cannot take any days off and you must commit to working every day outside of class on this course.

We will depend on the strong science and math classes that you have already had at MND. Part of this assignment reviews skills you have already learned (e.g. percent error, error difference, precision, etc.) within the new context of a physics perspective. Part of this assignment introduces new, key concepts we will need in physics.

**There are two tasks in this summer assignment.**

- 1 . **Intro to Physics:** You will sign up for an online course and complete some specific sections of the course. *Upon completion, you will write up a short description of an experiment. See the description on the following pages for the details.*
- 2 . **Vectors:** You will investigate some of the properties of vectors. *There will be a short assessment before the first lab - which is on vectors.*

The details for this summer assignment are on the following pages.

**Timeline:** Pick a time during the summer where you can reserve a couple of hours at a time for these tasks. You should not need more than 4-6 hours to complete the entire assignment. You will find it much easier (and faster) to complete this assignment if you do not rush through the videos and the practice calculations.

Have some fun with this assignment, enjoy your summer and we will see you in August!

Dr. Grinsted and Dr. Fletcher

# Physics Summer Assignment

## 1 Online Course: *Intro to Physics* with instructor Andy Brown

### 1.1 Register with Udacity

You first need to register with the course provider, Udacity. Registration is easy and does not require any information other than a name (or alias) and a valid email.

1. From a browser go to <https://auth.udacity.com/sign-in?next=https://classroom.udacity.com/authenticated>
2. Click the sign-up option at the upper left of the sign-in dialog box (Figure 1).
3. Once you have completed the registration you will get an email to verify the email account you provided. Click on the link in the email to complete your registration.

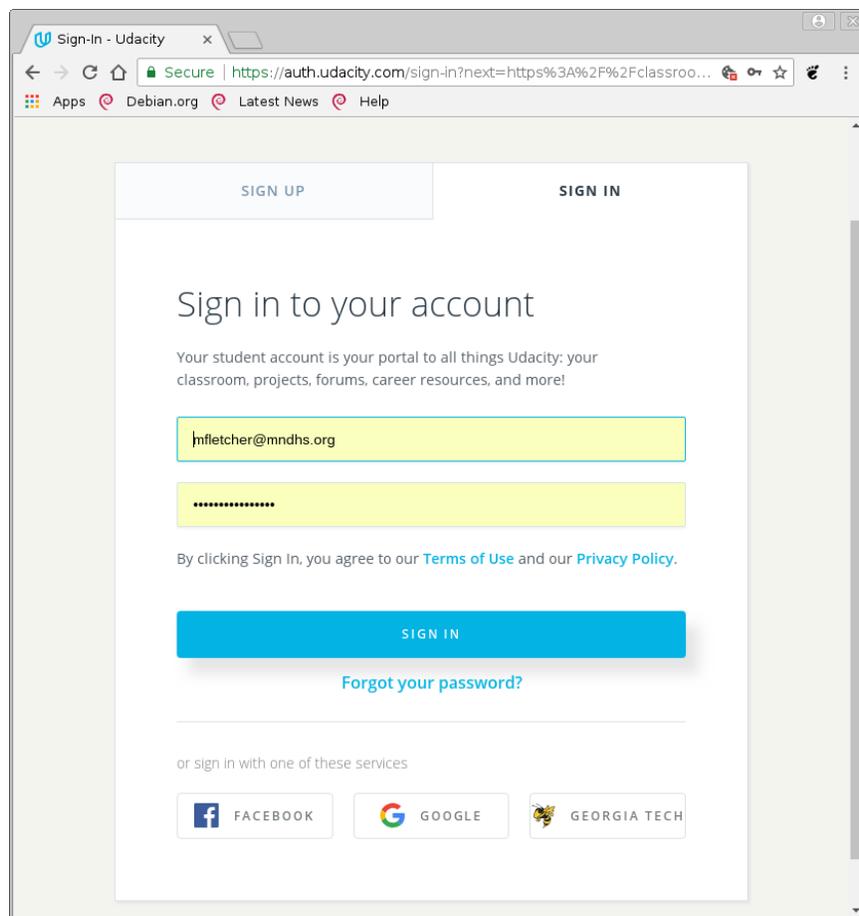


Fig. 1: Udacity Sign-Up/Sign-In Dialog

## 1.2 Sign-up for the *Intro to Physics* course with Andy Brown

Now, you will want to find the course.

1. At your home page, select the catalog. Then enter the word “*physics*” in the search region as shown in figure 2.

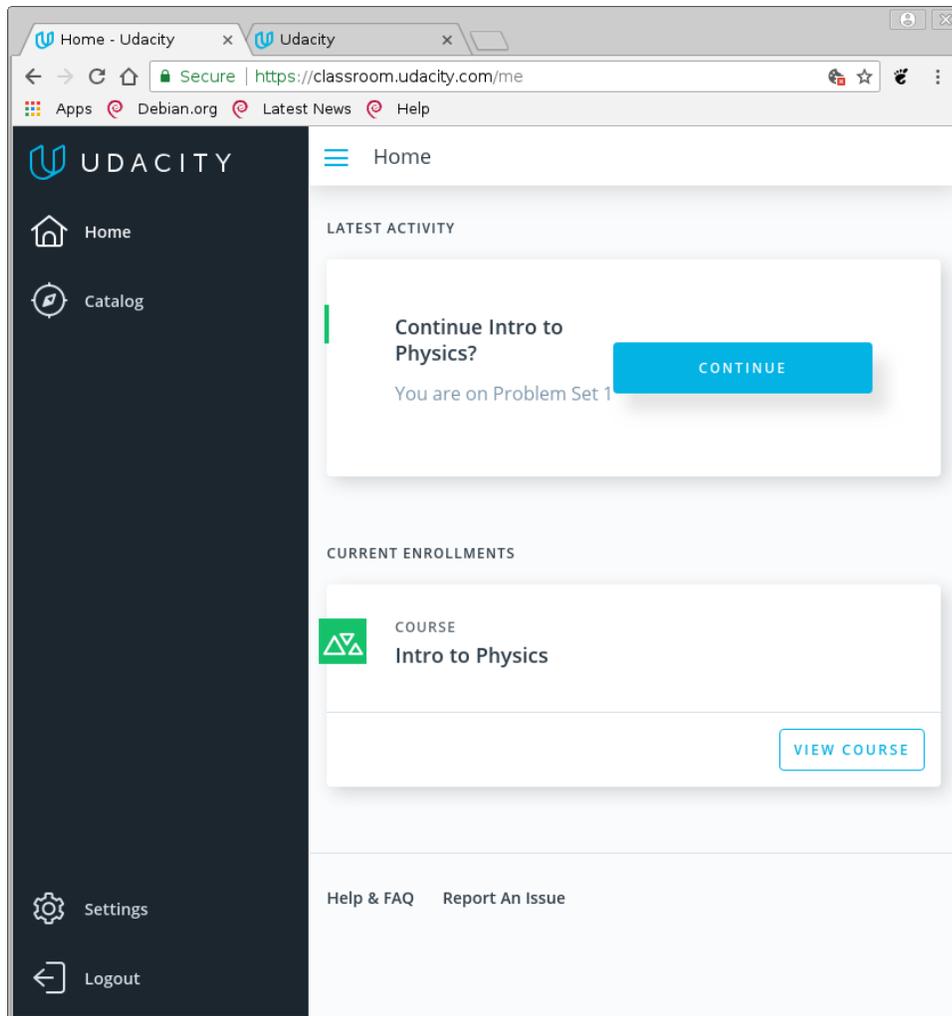


Fig. 2: Catalog Search

2. The search should begin automatically and the top result is the *“Intro To Physics”* course.
3. Click on this course and you will see the course home page shown in figure 3. Click on the *“Start Free Course”* button.

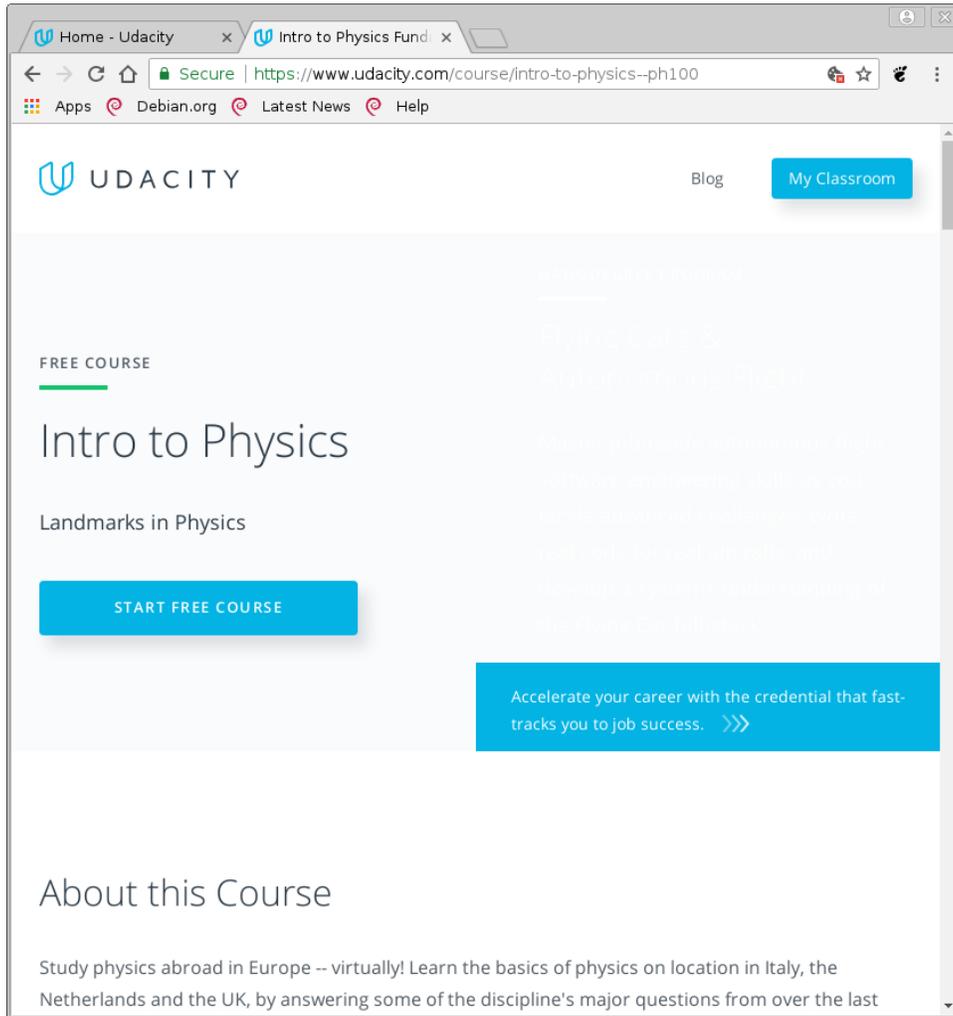


Fig. 3: Catalog Search

### 1.3 Complete the following sections of the course

The following two sections are a sequence of videos with short quiz questions embedded.

Most of the “quizzes” are meant to be answered intuitively. You are not expected to know the answer immediately, they are used to provoke thinking about the topic. Why did you choose your answer? Are you satisfied with the instructor's answer after you hear the explanation? If you did not choose the same answer, do you believe you need to adjust your understanding?

For this portion of the assignment, reserve a few hours. While the videos are short, you might want to investigate further some of the ideas which are presented.

#### Section 1a) Circumference of the Earth

<i>Duration (Min:Sec)</i>	<i>Title</i>
0:58	Udacity Presents. . .
0:52	Landmarks in Physics
2:08	What the Greeks knew (Part I)
3:45	What the Greeks knew (Part II)
2:22	Previous Attempts
0:58	Talking about error
1:35	Archimedes' Guess
1:09	Who was Archimedes?
0:40	Alternatives to guessing
1:22	Chat with Enrico Giusti (Part I)
1:10	Eratosthenes Advantage

#### Section 2b) What is motion?

<i>Duration (Min:Sec)</i>	<i>Title</i>
0:20	Intro to Unit 2
0:58	Why learn about motion?
1:13	Chat with Thomas Settle
1:08	Aristotle vs. Galileo
0:53	Looking at the evidence
1:15	Experiments with Motion
0:43	What can we learn from rolling balls? (Part I)
0:25	What can we learn from rolling balls? (Part II)
0:46	What is motion?
1:30	Acceleration
0:49	Solving for acceleration
1:29	Galileo's Experiment
1:27	Galileo's Data
0:48	Calculating error with multiple measurements (Part I)
0:25	Calculating error with multiple measurements (Part II)

### 1.4 Reflection

We will conduct a motion experiment within the first week based on the material you learned in these sections. Think back on what you learned.

Do you think you could conduct an experiment which required you to duplicate Galileo's experiment of rolling balls down an inclined ramp?

**Write up a short description of how you might do this. What equipment would you need and how would you conduct the experiment?**

## 2 Vectors

A new concept you will investigate is the vector. We will learn vectors very early in the year and use them for the entire year. Understanding vectors are critical to your success in physics. We will spend considerable time on this topic during our year together.

Please look at the links below.

The first link is a good, descriptive introduction to vectors. Do not worry if terminology is unfamiliar—this is what we will be learning during the year!

- <http://www.youtube.com/watch?v=EUrMI0DIh40>

The second link is another descriptive introduction to vectors with more of a science class perspective.

- [https://www.youtube.com/watch?v=\\_QC42w0npwQ](https://www.youtube.com/watch?v=_QC42w0npwQ)

There will be a short assessment before our first lab, which covers vectors.