

Lesson Plan: Coriolis Force, Coriolis Effect, and the Impact of Coriolis Effect on Climate

As a **high school** or **undergraduate Physics** or **Earth Sciences** teacher, you can use this set of computer-based tools to help you in teaching about **Coriolis Force, the Coriolis Effect, and how the Coriolis Effect influences climate (trade winds and upwelling)**.

This lesson plan allows students to understand the Coriolis Force, and the effect of the Coriolis Force on weather and climate. The videos and activity explain how the Coriolis effect determines the direction of trade winds and upwelling in the oceans.

Use this lesson plan to help your students find answers to:

- *What is the Coriolis Effect?*
- *How does the Coriolis Effect affect the direction of motion in the northern hemisphere?*
- *How does the Coriolis Effect affect the direction of motion in the southern hemisphere?*
- *How does the Coriolis Effect influence the direction of trade winds on Earth?*
- *What is upwelling? How does the Coriolis Effect affect upwelling in the oceans?*

About the Lesson Plan

Grade Level	High school, Undergraduate
Discipline	Physics, Earth Sciences

Topic(s) in Discipline	<u>Physics</u> : Coriolis Force, Coriolis Effect <u>Earth Sciences</u> : Coriolis Force, Coriolis Effect, Trade Winds, Upwelling
Climate Topic	Climate and the Atmosphere, Climate and the Hydrosphere
Location	Global
Access	Online, Offline
Language(s)	English
Approximate Time Required	40 – 45 min

1 Contents

- 1. Micro-lecture (video) (~8 min)** A micro-lecture (video) that introduces the Coriolis Effect
<https://www.youtube.com/watch?v=WsfY1MTKjKY>
- 2. Classroom/Laboratory activity (10 – 15 min)** A hands-on classroom/laboratory activity to explain the Coriolis Effect
<https://serc.carleton.edu/teachearth/activities/181248.html>
- 3. Micro-lecture (video) (~6 min)** A micro-lecture (video) that introduces the topic of upwelling in the oceans, and how the direction of motion of water is influenced by the Coriolis Effect
<https://www.youtube.com/watch?v=ucURSdSTZGU>

4. **Micro-lecture (video) (~6 min)**

A micro-lecture (video) that introduces the topic of trade winds, and how the direction of these winds is influenced by the Coriolis Effect

<https://www.youtube.com/watch?v=ySatA2n122Q>

5. **Suggested questions/assignments for learning evaluation**

- What is the Coriolis Effect?
- How does the Coriolis Effect affect the direction of motion in the northern hemisphere?
- How does the Coriolis Effect affect the direction of motion in the southern hemisphere?
- How does the Coriolis Effect influence the direction of trade winds on Earth?
- What is upwelling? How does the Coriolis Effect affect upwelling in the oceans?

2 Step-by-step User Guide



Here is a step-by-step guide to using this lesson plan in the classroom/laboratory. We have suggested these steps as a possible plan of action. You may customize the lesson plan according to your preferences and requirements.

1. **Introduce the topic by playing a micro-lecture (video)**

- Introduce the topic of Coriolis Force and Coriolis Effect.
- Play the micro-lecture (video) “[Coriolis Effect](#)”, by Prof. Raghu Murtugudde, University of Maryland (content developed for the TROP ICSU project at Science Media Center, IISER Pune), to provide students an overview of the Coriolis Effect.

The video, “Coriolis Effect”, is available at <https://www.youtube.com/watch?v=WsfY1MTKjKY>.

2. Conduct a classroom/laboratory activity

Next, conduct a hands-on classroom/laboratory activity, “[Coriolis Effect Activity](#)”, created by Laura Reiser Wetzel, Eckerd College, to help students gain a better understanding of the Coriolis Effect. In this activity, students use a simple paper-based model to answer questions and discuss the Coriolis Effect.

- Download the files for this activity (instructor notes, student handout, and answer key) from <https://serc.carleton.edu/teachearth/activities/181248.html>.
- Distribute copies of the student handout, and facilitate discussions on all the questions in the instructor notes.

3. Play a micro-lecture (video)

- Play the micro-lecture (video) “[Upwelling](#)”, by Prof. Raghu Murtugudde, University of Maryland (content developed for the TROP ICSU project at Science Media Center, IISER Pune), to provide students an overview of the impact of the Coriolis Effect on upwelling in the oceans.
- Discuss the effect of upwelling on the climate of various regions in the world.

The video, “Upwelling”, is available at <https://www.youtube.com/watch?v=ucURSdSTZGU>.

4. Play a micro-lecture (video)

- Play the micro-lecture (video) “[Trade Winds](#)”, by Prof. Raghu Murtugudde, University of Maryland (content developed for the TROP ICSU project at Science Media Center, IISER Pune), to provide students an overview of the impact of the Coriolis Effect on upwelling in the oceans.
- Discuss the effect of the direction of trade winds on the climate of various regions in the world.

The video, “Trade Winds”, is available at <https://www.youtube.com/watch?v=ucURSdSTZGU>.

5. Questions/Assignments

Use the tools and the concepts learned so far to discuss and determine answers to the following questions:

- *What is the Coriolis Effect?*
- *How does the Coriolis Effect affect the direction of motion in the northern hemisphere?*
- *How does the Coriolis Effect affect the direction of motion in the southern hemisphere?*
- *How does the Coriolis Effect influence the direction of trade winds on Earth?*
- *What is upwelling? How does the Coriolis Effect affect upwelling in the oceans?*

3 Learning Outcomes

The tools in this lesson plan will enable students to:

- describe the Coriolis Effect
- compare the influence of the Coriolis Effect on the direction of motion in the northern and southern hemispheres of Earth
- discuss the influence of the Coriolis Effect on the climate of a region

4 Additional Resources



If you or your students would like to explore the topic further, these additional resources will be useful.

1. Micro-lecture (video)

A micro-lecture (video), “The Coriolis effect”, from Khan Academy:

<https://www.khanacademy.org/partner-content/nova/clouds/v/hurricanes>

2. Reading

A reading, “Coriolis effect”, from National Geographic:

<https://www.nationalgeographic.org/encyclopedia/coriolis-effect/>

5 Credits/Copyrights

All the teaching tools in our collated list are owned by the corresponding creators/authors/organizations as listed on their websites. Please view the individual copyright and ownership details for each tool by following the individual links provided.

We have selected and analyzed the tools that align with the overall objective of our project and have provided the corresponding links. We do not claim ownership of or responsibility/liability for any of the listed tools.

1. **Micro-lecture (video), “Coriolis Effect”** [Prof. Raghu Murtugudde](#), University of Maryland (content developed for the TROP ICSU project, at the [Science Media Center, IISER Pune](#))
2. **Classroom/Laboratory activity, “Coriolis Effect Activity”** Laura Reiser Wetzel, Eckerd College, available on the Teach the Earth Portal at [SERC Carleton](#)
3. **Micro-lecture (video), “Upwelling”** [Prof. Raghu Murtugudde](#), University of Maryland (content developed for the TROP ICSU project, at the [Science Media Center, IISER Pune](#))
4. **Micro-lecture (video), “Trade Winds”** [Prof. Raghu Murtugudde](#), University of Maryland (content developed for the TROP ICSU project at the [Science Media Center, IISER Pune](#))
5. **Additional Resources** [Khan Academy](#);
[National Geographic](#)