



**eDynamic**Learning

— CAREER & ELECTIVE COURSES —



Course Syllabus



**Course Code:** EDL071

# Introduction to Renewable Technologies

## Course Description

Cars that run on used vegetable oil. Electricity produced from your garbage. A windmill made from spare bicycle parts that pumps water to crops. Energy is life. So, how do we address the world’s growing concerns about energy sources? Where will it come from in the future? How can energy be something sustainable, renewable, and accessible? Introduction to Renewable Technologies begins to uncover the development of new energy technologies and explores how recent approaches to generating, storing, and creating this precious resource have evolved. By gaining a larger understanding of this challenge, we, as thoughtful people, can implement real change and unlock the solution needed for a safer, cleaner, and more enduring world.

## Table of Contents

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Lesson 1: Introduction to Renewable Technologies . . . . .	3
Lesson 2: Climate Change and Energy Policies . . . . .	4
Lesson 3: The Electric Power System and Fossil Fuels . . . . .	5
Lesson 4: Nuclear Power . . . . .	6
Midterm Exam . . . . .	7
Lesson 5: Solar Energy . . . . .	8
Lesson 6: Wind Energy . . . . .	9
Lesson 7: Biomass and Biofuels . . . . .	10
Lesson 8: Geothermal and Hydroelectric Energy . . . . .	11
Final Exam . . . . .	12



## Lesson 1: Introduction to Renewable Technologies

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### Lesson Summary

How are your lights, cell phones, and water heaters powered? Every time you turn on a light or make a call, you may be using power from a limited source that emits pollutants. Or perhaps the power comes from a clean, replenishable source. In the United States, there is a 93 percent chance you are using energy from a nonrenewable energy source. Nonrenewable energy sources include coal, oil, and natural gas. Eventually they run out. Renewable energy sources come from sources that will not run out. They either replenish through a natural process or come from a source with an infinite supply. These might be sunlight, wind, rain, tides, waves, and the earth's natural heat. In this lesson, you'll learn about renewable energy technologies and why they are important. You'll also learn about the history of renewable energy technologies. Finally, you'll look at some of the countries making a difference by using renewable energy.

### Learning Objectives

- Define renewable energy technologies.
- Identify different kinds of renewable energy technologies.
- Defend reasons for developing and using renewable technologies.
- Recount the history of renewable energy technologies.
- Describe where and how renewable energy is currently used globally.



## Lesson 2: Climate Change and Energy Policies

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### Lesson Summary

You've probably heard of global warming. You might understand that it is a slow temperature increase all over the world. You might also know that this temperature increase somehow harms the environment. But how? In this lesson, you'll learn about global warming and how it causes climate change. You'll also learn how climate change harms wildlife, natural resources, and humans. Consumers' use of electricity and cars are the main causes. But changing consumer habits is not as easy as it seems. Several countries have implemented successful policies to stop global warming. By examining these success stories, we'll look at how we can use these examples to build a framework for future climate change policies.

### Learning Objectives

- Discuss global climate change issues.
- Describe how consumer habits influence climate change and energy policies.
- Evaluate climate change policies globally.
- Create frameworks for energy evaluation, including economic, sustainability, and tradeoffs.



## Lesson 3: The Electric Power System and Fossil Fuels

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### Lesson Summary

Why do we continue to use nonrenewable energy sources? We answer the question by looking at how electricity gets from Point A to Point B. The history of electricity explains how we built this system. In this lesson, you'll explore the infrastructure and history of electricity. You'll learn about the tradeoffs in using nonrenewable sources, specifically fossil fuels, for generating power. You'll also look at the new technologies we could use.

### Learning Objectives

- Discuss the history of the electric power system and the use of fossil fuels.
- Evaluate the current electric power system and use of fossil fuels.
- Investigate the advantages and disadvantages of the electric power system and use of fossil fuels.
- Examine new technologies and changes in the use of fossil fuels and the electric power system.



## Lesson 4: Nuclear Power

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### Lesson Summary

If all you know about nuclear power comes from The Simpsons, you're about to find out that there's a whole lot more to nuclear power than what happens at the fictional Springfield nuclear power plant. Nuclear power is a chemical process of splitting atoms. It is very efficient and has the potential to power the entire world. However, it does have some disadvantages. Nuclear meltdowns can be devastating to the surrounding environment and can even cause widespread death if not managed responsibly.

### Learning Objectives

- Define nuclear energy and discuss how it is harnessed.
- Describe nuclear fission.
- Discuss the advantages and disadvantages of nuclear power.
- Explain the societal debate over nuclear power.



## Midterm Exam

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### Learning Objectives

- Review information acquired and mastered from this course up to this point.
- Take a course exam based on material from the first four lessons in this course (Note: You will be able to open this exam only one time.)



## Lesson 5: Solar Energy

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### Lesson Summary

Solar energy is getting a lot of attention. The sun provides lots and lots of energy, and we can use it in our homes and offices without having to use the local power company. Technologies that harness solar energy are varied and sophisticated. The sun's heat can be used in many ways, including providing steam for traditional power plants. However, these technologies are still immature. So large-scale solar power continues to be expensive. It can also be unreliable when the sun is not shining. In this lesson, you'll learn about solar energy and the exciting ways we can use it to power our lives.

### Learning Objectives

- Define solar energy and discuss how it is harnessed.
- Compare passive solar and active solar energy.
- Examine photovoltaic cells and solar thermal systems.
- Outline the advantages and disadvantages of solar energy.



## Lesson 6: Wind Energy

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### Lesson Summary

Wind energy has been around for centuries, as early as 5000 BCE. But it's been getting a lot of attention lately as a renewable energy technology. It's clean and sustainable, but wind turbines take up a lot of land and make a lot of noise. In addition, harnessing wind energy requires an area where the climate is optimal, and the land is preferably flat and rural. In areas with a lot of wind, this renewable technology is inexpensive and ideal, especially for homeowners who want to power their own homes. In this lesson, you'll learn more about how wind energy is created and the advantages and disadvantages of using it as an energy source.

### Learning Objectives

- Describe wind energy and how it has been used historically.
- Consider environmental factors that affect harnessing wind energy.
- Discuss kinetic energy.
- Evaluate the advantages and disadvantages of wind energy.



## Lesson 7: Biomass and Biofuels

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### Lesson Summary

Amongst sources of energy, biomass is the oldest. When humans first set a fire using wood, biomass energy was born. In this lesson, you'll learn about how we get electricity from biomass and biofuel. You'll also learn about the process of converting biomass to biofuels. Finally, you'll look at the different options for using biofuels and the pros and cons of both biomass and biofuels.

### Learning Objectives

- Describe the major sources of biomass.
- Create a life cycle analysis for biomass conversion.
- Examine different biofuel options.
- Outline the advantages and disadvantages for biomass and biofuel energy.



## Lesson 8: Geothermal and Hydroelectric Energy

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### Lesson Summary

By now you know that energy is everywhere. And we could get it from anywhere. It's just a matter of finding out how to convert it so we can use it for electricity. In this last lesson, you'll learn about geothermal and hydroelectric energy. Both of these renewable energy technologies use the earth's natural energy. One uses the heat deep in the earth's crust; the other uses the power of water.

### Learning Objectives

- Describe types of geothermal energy.
- Discuss how hydroelectric energy is created.
- Examine environmental factors that influence these energy types.
- Evaluate the advantages and disadvantages of geothermal and hydroelectric energy.



## Final Exam

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### Learning Objectives

- Review information acquired and mastered from this course up to this point.
- Take a course exam based on material from lessons five to eight in this course – the last four lessons. (Note: You will be able to open this exam only one time.)