## Unit 1

### Lesson 1.1

|  |  |  |
| --- | --- | --- |
| **Term** | **Definition** | **Example Sentence** |
| climate change | Changes in the measures of Earth’s climate over a long period of time including weather, precipitation, and temperature patterns. | Rising global temperatures due to climate change are causing more frequent and intense extreme weather events, such as hurricanes and heatwaves. |
| fossil fuels | Natural carbon-rich fuels that are formed over long periods of time and release greenhouse gases when burned. | Since 1750, the burning of fossil fuels has added more and more carbon dioxide to the atmosphere, rapidly warming the planet and causing climate change. |
| greenhouse gases | Gases that trap heat in Earth’s atmosphere. | Greenhouse gases, such as carbon dioxide, methane, and nitrous oxide, trap heat from the Sun inside Earth’s atmosphere. |
| parts per million (ppm) | A unit of measurement used to express very small concentrations of a substance within a larger mixture, often used for measuring gases like carbon dioxide (CO₂) in the atmosphere. | In June 2023, the concentration of carbon dioxide (CO2) in Earth’s atmosphere reached 424 parts per million (ppm). |
| temperature anomaly | A way of measuring the increase or decrease in temperature in relation to a baseline average. | This chart shows both temperature anomaly and carbon dioxide atmospheric concentration over the last 800,000 years. |

### Lesson 1.2

|  |  |  |
| --- | --- | --- |
| **Term** | **Definition** | **Example Sentence** |
| disinformation | False information deliberately spread to mislead, either by influencing public opinion or obscuring the truth. | Disinformation about climate change is often spread through misleading claims, such as exaggerating scientific uncertainty. |
| greenwashing | When a company exaggerates or falsely claims to be more sustainable than it actually is. | Greenwashing is sometimes hard to identify because companies work hard to disguise it. |
| fossil fuels | Natural carbon-rich fuels that are formed over long periods of time and release greenhouse gases when burned. | Since 1750, the burning of fossil fuels has added more and more carbon dioxide to the atmosphere, rapidly warming the planet and causing climate change. |
| Intergovernmental Panel on Climate Change (IPCC) | An international organization that assesses the science of climate change. | The Intergovernmental Panel on Climate Change (IPCC) says that “Scientific evidence for the warming of the climate system is unequivocal.” |
| misinformation | False or inaccurate information. | Misinformation can lead to misunderstanding climate solutions, their effectiveness, and their drawbacks. |

### Lesson 1.3

|  |  |  |
| --- | --- | --- |
| **Term** | **Definition** | **Example Sentence** |
| **optimism** | A sense of hope and confidence in the future. | Optimism inspires people to innovate and drives people to take risks—investing money and time in the hopes of making a better future. |
| **perspective** | An individual’s or group’s point of view on or attitude toward something. | Our perspective is crucial when it comes to tackling climate change. |
| **climate doomer** | Someone who, when it comes to climate change, believes either that fear will inspire action or that there’s no point in acting because it’s already too late to solve climate change. | Climate doomers might think otherwise, but there’s a lot we can do to mitigate climate change. |
| **climate optimist** | Someone who, when it comes to climate change, believes that hope is a better motivator than fear and that we must focus on more than the bad news of climate change. | Climate optimists believe we can make a difference if we act quickly and get our priorities in order. |

### Lesson 1.4

|  |  |  |
| --- | --- | --- |
| **Term** | **Definition** | **Example Sentence** |
| **anthropogenic** | Caused by human activity. | Anthropogenic carbon dioxide emissions must quickly decline if we want to avoid the worst impacts of climate change. |
| **net zero** | Achieving a balance between the amount of greenhouse gases emitted into the atmosphere and the amount removed. | Specifically, the IPCC report called for global greenhouse gas emissions to reach “net zero” by 2050. |
| **emissions** | The release of substances, such as gases, particles, or radiation, into the air, water, or soil. | The countries with the highest CO₂ emissions per person are wealthy countries—like Canada and Australia—or oil-producers like Qatar and Saudi Arabia. |
| **contemporary** | Existing or happening in the present; modern, new. | Many contemporary scientists are developing innovation solutions to address climate change. |
| **per capita** | Per person. A measurement often used to compare metrics between countries or cities while accounting for differing population sizes. | Per capita emissions are much lower in populous countries, such as India, China, and Nigeria. |

## Unit 2

### Lesson 2.1

|  |  |  |
| --- | --- | --- |
| **Term** | **Definition** | **Example Sentence** |
| **scale** | The relative magnitude or size of something, often in reference to the level at which an issue emerges or is addressed. | It's important to understand the impacts of climate change at different scales. |
| **indirect impacts** | Changes to the everyday systems we rely upon for our food, housing, and security as a result of climate change interacting with our human systems. | Other types of indirect impacts of climate change include increased heat- and cold-related illnesses, respiratory problems, and challenges to mental health. |
| **direct impacts** | Measurable changes in Earth’s natural systems directly caused by warming temperatures. | Another set of direct impacts is the increased likelihood—and often severity—of some naturally occurring events, such as floods, storms, and wildfires. |
| **methane** | A colorless greenhouse gas with about 28 times the warming power of CO₂. Occurs in nature through decomposition; also occurs as a result of human activities such as fertilizer production. | As polar ice disappears, it’s releasing huge amounts of the greenhouse gas methane, which has been underground for millennia. |
| **mitigation** | Actions taken to reduce or prevent the emissions of greenhouse gases. | Mitigation solutions include everything from renewable energy to electric cars and public transportation. |
| **climate model** | A simulation of Earth’s climate system used to re-create past climatic conditions and predict future conditions based on different factors including human action. | As technology advances, climate model predictions have become increasingly accurate. |

### Lesson 2.2

| **Term** | **Definition** | **Example Sentence** |
| --- | --- | --- |
| **biomes** | Distinct regions of the planet that are defined by a shared ecology and often have similar climates, soils, and geography. | At a 2˚ C increase, 13% of Earth’s land will shift to a new biome. |
| **climate model** | A simulation of Earth's climate system used to re-create past climatic conditions and predict future conditions based on a number factors including human action. | As technology advances, climate model predictions have become increasingly accurate. |
| **direct impacts** | Measurable changes in Earth’s natural systems caused directly by warming temperatures. | Why do you think it’s important that we measure and understand the direct impacts of climate change? |
| **sea-level rise** | The average increase in the water level of the Earth's oceans as a result of climate change. | Sea-level rise is a huge problem for humanity because coastal regions are often densely populated.. |
| **temperature anomaly** | A way of measuring the increase or decrease in temperature from a baseline average. | The trend is even more apparent when we overlay global temperature anomaly alongside sea-level rise. |

### Lesson 2.3

|  |  |  |
| --- | --- | --- |
| **Term** | **Definition** | **Example Sentence** |
| **indirect impacts** | Changes to the everyday systems we rely upon for our food, housing, and security that are the result of climate change interacting with our human systems. | It is important to understand indirect impacts because climate change effects are wide-reaching and will impact everyone, although not always equally. |
| **disease vectors** | Living organisms that spread infectious diseases between animals and/or humans. | Some areas will see more rainfall and standing water, resulting in a larger geographic range for disease vectors such as mosquitoes. |
| **infrastructure** | The physical assets and systems that enable our daily lives, including transportation, energy, buildings, and sanitation. | Extreme weather events like floods, hurricanes, and wildfires can damage or destroy infrastructure. |
| **migration** | The process of people leaving their homes temporarily or permanently. | Climate change is driving migration, as rising sea levels and extreme weather force people to relocate to safer areas. |
| **climate justice** | The idea that the challenges we're facing as our climate changes shouldn't affect any one community more than others, even though the physical impacts are different around the world. | Climate justice proposes that these communities should have the power to improve their situations—and they should be able to get the support they need to adapt. |

### Lesson 2.4

| **Term** | **Definition** | **Example Sentence** |
| --- | --- | --- |
| **climate change** | Changes in the measures of Earth’s climate over a long period of time, including weather, precipitation, and temperature patterns. | It’s important to learn the skill of claim testing early and to use it when evaluating evidence about climate change. |
| **global warming** | The rise in global temperatures due mainly to the emission of greenhouse gases. | Global warming will lead to sea-level rise, increased drought, and more tropical storms. |
| **weather** | Short-term atmospheric conditions. | Extreme weather will get worse in many places. |
| **climate** | The long-term weather patterns of a specific region. | As climates shift, areas will transition to different biomes. |
| **greenhouse gases** | Gases that trap heat in the Earth’s atmosphere, producing a warming effect. | Greenhouse gases, such as carbon dioxide, methane, and nitrous oxide, trap heat from the Sun inside Earth’s atmosphere. |
| **ozone layer** | A protective layer of Earth’s atmosphere that absorbs most of the Sun’s harmful ultraviolet (UV) radiation. | While the use of harmful chemicals depleted our ozone layer, it has recovered since then. |
| **carbon footprint** | The total amount of greenhouse gases generated by an individual, organization, product, or activity. | Carbon footprints are often used as a tool to focus on what individuals can do, but it is just as helpful to look at the carbon footprints of large companies and nations. |
| **carbon cycle** | The natural process by which carbon is exchanged among the atmosphere, oceans, soil, plants, and animals. | Human activities, particularly the burning of fossil fuels, are altering the Earth’s natural carbon cycle and driving climate change. |
| **sequestration** | The process of capturing and storing carbon dioxide from the atmosphere in a stable form. | Carbon sequestration helps reduce atmospheric carbon dioxide by capturing it and safely storing it. |
| **adaptation** | Responding to the current and future impacts of climate change to minimize harm. | Wetland restoration can also be a form of adaptation, as wetlands reduce the intensity and impact of storms and hurricanes that pass over them. |
| **mitigation** | Actions taken to reduce or prevent the emissions of greenhouse gases. | Mitigation solutions include everything from renewable energy to electric cars and public transportation. |
| **fossil fuels** | Energy sources formed from the remains of ancient plants and animals. | Since 1750, the burning of fossil fuels has added more and more carbon dioxide to the atmosphere, rapidly warming the planet and causing climate change. |
| **clean energy** | Energy sources that are naturally replenished and emit little to no greenhouse gases. | Many countries are investing in clean energy sources like wind and solar to reduce reliance on fossil fuels and lower emissions. |

## Unit 3

### Lesson 3.1

|  |  |  |
| --- | --- | --- |
| **Term** | **Definition** | **Example Sentence** |
| **adaptation** | Responding to the current and future impacts of climate change to minimize harm. | Wetland restoration can also be a form of adaptation, as wetlands reduce the intensity and impact of storms and hurricanes that pass over them. |
| **geoengineering** | The intentional alteration of the Earth’s oceans, soils, or atmosphere, usually in order to reduce the effects of climate change. | Taking CO2 out of the atmosphere is one form of geoengineering. |
| **mitigation** | Actions taken to reduce or prevent the emissions of greenhouse gases. | Mitigation solutions include everything from renewable energy to electric cars and public transportation. |
| **resilience** | The ability to withstand, adapt to, and recover from challenges or disruptions. | A community facing sea-level rise could relocate critical infrastructure—like energy generation plants or transportation networks—to higher ground to increase resilience. |

### Lesson 3.2

| **Term** | **Definition** | **Example Sentence** |
| --- | --- | --- |
| **adaptation** | Responding to the current and future impacts of climate change to minimize harm. | Wetland restoration can also be a form of adaptation, as wetlands reduce the intensity and impact of storms and hurricanes that pass over them. |
| **weatherization** | The process of sealing and insulating building envelopes to regulate building temperature during extreme weather and reduce a building’s energy needs. | Through the process of weatherization, old buildings can often be renovated to be more insulated and let less heat in and out. |
| **geothermal** | An energy source or heating and cooling system that uses the Earth’s natural heat. | Geothermal heating systems can reduce reliance on fossil-fuel-powered systems. |
| **resilience** | the ability to withstand, adapt to, and recover from challenges or disruptions. | A community facing sea-level rise could relocate critical infrastructure—like energy generation plants or transportation networks—to higher ground to increase resilience. |
| **aquaculture** | The breeding and harvesting of fish, shellfish, and other aquatic organisms for food and other purposes. | The Earth’s changing climate is creating a lot of problems for aquaculture, especially for less wealthy farmers in regions most severely impacted by the climate crisis. |
| **Climate Information Services (CIS)** | Tools that collect and share regional climate information so people can manage local risks and problems and adapt practices. | Using Climate Information Systems, researchers work together with farmers to establish climate-smart procedures to make farming more resilient and sustainable. |

### Lesson 3.3

|  |  |  |
| --- | --- | --- |
| **Term** | **Definition** | **Example Sentence** |
| **climate innovation** | The research, development, and scaling of new climate solutions. | Climate innovation means both new technologies and new ways of doing and thinking about things. |
| **decarbonize** | To reduce or eliminate greenhouse gas emissions from processes, products, and systems. | Government and industries are working to decarbonize the economy by reducing fossil fuel dependence. |
| **renewable energy** | Energy derived from natural sources that are continuously replenished. | The costs of renewable energy technologies like wind and solar have dropped a lot in recent years. |
| **research and development (R&D)** | The process of investigating, designing, and creating new products, technologies, or improvements to existing systems. | For many companies, zero-carbon cement is still in the research and development phase, with the processes and designs still being developed. |

### Lesson 3.4

| **Term** | **Definition** | **Example Sentence** |
| --- | --- | --- |
| **innovation** | A new technology or way of doing and thinking about things; the process of research, development, and scaling something new. | We need to develop a wide range of health and agricultural innovations so that those living in areas impacted by extreme drought, flooding, and severe weather have access to nutritious food and fresh water. |
| **regulation** | A rule, law, or policy made by a government to control the activities of businesses or individuals, often by setting standards or requirements. | Regulations exist to ensure companies and communities follow basic guidelines—such as building codes and public transportation policies—that can collectively help reduce emissions. |
| **greenwashing** | When a company exaggerates or falsely claims to be more sustainable than it actually is. | Greenwashing is sometimes hard to identify because companies work hard to disguise it. |
| **lever of power** | Types of actions people and organizations can take to promote climate solutions. | By working in strategic ways at each lever of power, we can amplify the impact of our actions. |
| **policy** | A law, rule, process, practice, or action of a government or other organization, often used as a basis for decision-making. | The government implemented a policy requiring all new buildings to use energy-efficient heating and cooling systems. |
| **nongovernmental organization (NGO)** | A private organization that serves public interests at local, national, or international levels and includes groups like nonprofits, community-based organizations, and advocacy groups. | NGOs like the Sierra Club, Earthjustice, and the Environmental Defense Fund play a crucial role in amplifying the power of other groups to have an impact. |

### Lesson 3.5

|  |  |  |
| --- | --- | --- |
| **Term** | **Definition** | **Example Sentence** |
| **carbon tax** | A tax on emissions associated with burning fossil fuels that makes visible the “hidden” cost of carbon emissions. | Carbon taxes also help create incentives to come up with carbon-free alternatives to save money. |
| **green premium** | The additional cost for a clean technology over one that emits greenhouse gases. | The green premium is a helpful tool for evaluating climate solutions and helping us decide where to focus our efforts. |
| **net zero** | Achieving a balance between the amount of greenhouse gases emitted into the atmosphere and the amount removed. | The cost difference between a net-zero alternative and a traditional carbon-emitting option is called the green premium. |
| **subsidy** | Money provided by the government to help make a product or service more affordable. | The government introduced a subsidy for electric vehicles to make them more affordable and to encourage the transition to clean transportation. |
| **carbon capture and sequestration (CCS)** | The technology and processes that collect CO2 at the point of emissions to then store underground or elsewhere. | Many power plants are investing in carbon capture and sequestration (CCS) technology to trap CO₂ emissions and store them underground, reducing their environmental impact. |

## Unit 4

### Lesson 4.1

|  |  |  |
| --- | --- | --- |
| **Term** | **Definition** | **Example Sentence** |
| **emissions** | The release of substances, such as gases, particles, or radiation, into the air, water, or soil. | The factory installed new filters to reduce its emissions of harmful pollutants into the air. |
| **Grand Challenges** | The five categories of human emissions sources, which are also the five categories of mitigation solutions. | The breakdown of the five Grand Challenges looks different in every country. |
| **decarbonization** | The reduction or elimination of greenhouse gas emissions from processes, products, and systems. | Decarbonization is essential for combating climate change, requiring a shift from fossil fuels to low- or zero-carbon alternatives. |
| **manufacturing** | The use of labor, machinery, and chemical processes to turn raw materials into products like cement, steel, and plastic. | The manufacturing processes we use to create concrete, steel, glass, and other  materials produce almost a third of humanity’s annual carbon emissions. |

### Lesson 4.2

|  |  |  |
| --- | --- | --- |
| **Term** | **Definition** | **Example Sentence** |
| **decarbonization** | The reduction or elimination of greenhouse gas emissions from processes, products, and systems. | Decarbonization is essential for combating climate change, requiring a shift from fossil fuels to low- or zero-carbon alternatives. |
| **carbon capture and sequestration (CCS)** | The technology and processes that collect CO2 at the point of emissions to then store underground or elsewhere. | Many power plants are investing in carbon capture and sequestration (CCS) technology to trap CO₂ emissions and store them underground, reducing their environmental impact. |
| **direct air capture (DAC)** | Technology that pulls CO2 directly from the atmosphere to filter, collect, concentrate, and permanently store it deep underground or to use it in other processes. | In 2023, only 27 direct air capture plants were operational, with another 130 in development. |
| **hydroelectric power** | Energy generated by the movement of water through the use of turbines and gravity. | Many countries rely on hydroelectric power as a renewable energy source, using dams to generate electricity from flowing water. |
| **nuclear energy** | Energy generated from nuclear reactions, which involve the splitting or fusing of atoms | But despite its bad reputation, nuclear energy is statistically one of the safest ways that humans generate electricity. |
| **renewable energy** | Energy derived from natural sources that are continuously replenished. | Solutions that produce electricity through renewable energy, such as wind and solar, can make a big difference. |

### Lesson 4.3

|  |  |  |
| --- | --- | --- |
| **Term** | **Definition** | **Example Sentence** |
| **policy** | A law, rule, process, practice, or action of a government or other organization, often used as a basis for decision-making. | The government implemented a policy requiring all new buildings to use energy-efficient heating and cooling systems. |
| **subsidy** | Money provided by the government to help make a product or service more affordable. | The government introduced a subsidy for electric vehicles to make them more affordable and to encourage the transition to clean transportation. |
| **research and development (R&D)** | The process of investigating, designing, and creating new products, technologies, or improvements to existing systems. | For many companies, zero-carbon cement is still in the research and development phase with the processes and designs still being developed. |
| **standards** | Models or expected rules of measure established by an authority such as a government. | Many countries have adopted strict emissions standards to reduce air pollution and combat climate change. |
| **cap-and-trade** | A program that sets a cap on greenhouse gas emissions that steadily lowers over time in order to curb emissions and, in many cases, raise money to address climate change. | The cap-and-trade system allows companies to buy and sell emissions permits, creating a financial incentive to reduce greenhouse gas emissions over time. |
| **Inflation Reduction Act** | A US federal law that aims to encourage clean energy and low-carbon technologies while also investing in domestic energy production, reducing the budget deficit, and lowering prescription drug prices. | Legislation like the Inflation Reduction Act promotes climate action through things like subsidies and tax incentives. |

### Lesson 4.4

| **Term** | **Definition** | **Example Sentence** |
| --- | --- | --- |
| **crop yields** | Amount of crop grown, usually for food, livestock feed, or fuel. | Both droughts and floods are expected to become more common, reducing crop yields and livestock production. |
| **malnutrition** | A health condition that develops when someone is missing key nutrients from their diet that they need to maintain healthy tissues and organ function. | In regions like sub-Saharan Africa, where over half the population depends on farming, less productive farms could lead to more malnutrition, poverty, and economic hardship. |
| **infrastructure** | The physical assets and systems that enable our daily lives, including transportation, energy, buildings, and sanitation. | Extreme weather events like floods, hurricanes, and wildfires can damage or destroy infrastructure. |
| **hydrogen fuel** | A clean energy source that produces energy from the conversion of gaseous hydrogen to water. | Heavy-duty vehicles, such as trucks and ships, will need new technologies like hydrogen fuel cells and biofuels to continue to move the goods we use every day. |
| **biofuel** | A liquid fuel made from renewable biological sources, such as plants and algae. | Many airlines are exploring biofuel made from plant-based materials to reduce their dependence on fossil fuels. |

## Unit 5

### Lesson 5.1

|  |  |  |
| --- | --- | --- |
| **Term** | **Definition** | **Example Sentence** |
| **hydrologist** | A scientist who studies water, its properties, and its movement. | There will be growing demand for scientists, including hydrologists, soil and plant scientists, and atmospheric researchers. |
| **epidemiologist** | A health professional who studies the cause and transmission of diseases. | In the future, fields like healthcare may expand as more nurses, epidemiologists, and public-health officials are needed to handle new health risks caused by climate change. |
| **sector** | A distinct area of the economy. | Trade schools and vocational programs, especially in the energy and construction sectors, can help workers move into climate-related careers. |

### Lesson 5.2

|  |  |  |
| --- | --- | --- |
| **Term** | **Definition** | **Example Sentence** |
| **migration** | The process of people leaving their homes temporarily or permanently. | Climate change is driving migration as rising sea levels and extreme weather force people to relocate to safer areas. |
| **implementation** | The process of carrying out or putting something into effect. | The implementation of stricter emissions regulations has helped reduce air pollution and encourage the use of renewable energy. |

### Lesson 5.3

|  |  |  |
| --- | --- | --- |
| **Term** | **Definition** | **Example Sentence** |
| **policy** | A law, rule, process, practice, or action of a government or other organization, often used as a basis for decision-making. | The government implemented a policy requiring all new buildings to use energy-efficient heating and cooling systems. |
| **advocacy** | Action done in support of a cause, policy, or candidate. | After years of advocacy, the students successfully pushed the school district to transition to electric buses. |
| **subsidy** | Money provided by the government to help make a product or service more affordable. | The government introduced a subsidy for electric vehicles to make them more affordable and to encourage the transition to clean transportation. |
| **research and development (R&D)** | The process of investigating, designing, and creating new products, technologies, or improvements to existing systems. | For many companies, zero-carbon cement is still in the research and development phase with the processes and designs still being developed. |
| **standards** | Models or expected rules of measure established by an authority such as a government. | Many countries have adopted strict emissions standards to reduce air pollution and combat climate change. |

### Lesson 5.4

|  |  |  |
| --- | --- | --- |
| **Term** | **Definition** | **Example Sentence** |
| **advocacy** | Action done in support of a cause, policy, or candidate. | After years of advocacy, the students successfully pushed the school district to transition to electric buses. |
| **resolution** | A formal statement by a legislative body adopted as their opinion or intent. | The students successfully advocated for their school board to adopt a clean energy resolution, setting a goal of 100% renewable energy by 2030. |
| **incentive** | Something that motivates someone to perform a desired action. | Some climate policies use tax incentives to encourage businesses and individuals to purchase energy efficient equipment or install solar power. |
| **proposal** | A suggested course of action put forward for consideration. | A group of students persisted until the commissioners recommended their zoning proposal to allow for wind turbines. |