
ENVS 011: Introduction to Carbon Capture and Storage (CCS)

Hours: 15 hours

Delivery Mode: Classroom, Online Asynchronous

Description

In this 15-hour Introduction to Carbon Capture and Storage (CCS) course, you'll gain an overview of the carbon capture and storage chain of technologies and their application, with a focus on Canada in particular. Delivered online asynchronously, our industry-experienced instructor will engage you throughout the course where you'll gain knowledge about CCS's role in advancing Canada's sustainable energy system, as well as explore emerging uses for CO₂ capture, benefits, challenges and the socio-economic impacts of developing Canada's CCS sector. This course has been designed for anyone interested in learning more about CCS.

ENVS-011 is a mandatory prerequisite for all remaining courses in our Carbon Capture and Storage (CSS) micro-credentials series. The series is intended for upskilling energy services workers, engineers, geoscience professionals, operators, technologists or trades professionals.

Outcomes

Upon completion of this course, you will be able to:

- Examine the major components of the CCS value chain and how they interact in real-world applications
- Explain current and emerging CO₂ utilization pathways and their potential relevance to Canadian industries
- Analyze the role of CCS in Canada's decarbonization strategy, including existing projects, sectoral opportunities, and policy drivers.
- Interpret the socio-economic impacts of CCS development, including workforce implications and Indigenous participation.

Course Materials

All of the required learning materials for this course are provided on the course website.

Required Technology and Software

Ensure that your computer meets [SAIT's Minimum Technical Requirements](#) for online learning success.

Assessments

NOTE: This course qualifies for a SAITMicro badge. Please visit our [SAITMicro](#) page to learn more.

- Students who earn a D (50%) or higher will pass this course, and
- Students who wish to earn a micro-credential and digital SAITMicro badge for this course must achieve a minimum grade of A- (80%) or higher.

Assessments	Value
Assignment 1: CCS System Analysis & Utilization Matching	35%
Assignment 2: CCS in Canada – Strategic & Socio-Economic Case Analysis	35%
Assignment 3: Activities (combined)	30%
Total:	100%

Unit 1: Overview of CCS Technologies and the Value Chain

Outcome

- Examine the major components of the CCS value chain and how they interact in real-world applications

Objectives

- Describe the fundamental properties of CO₂ and explain why its management is critical to climate mitigation.
- Summarize the environmental impacts of CO₂ emissions using quantitative or qualitative evidence.
- Explain the purpose of each CCS value-chain component (carbon capture, pipeline transmission, underground storage, measurement, monitoring, and verification)
- Illustrate how CCS value-chain components connect in an end-to-end CCS system.
- Explain how CCS contributes to a low-carbon energy system, referencing at least one Canadian example.
- Identify the CCS value-chain components required for a given real-world application
- Interpret a simplified CCS system diagram to identify key components and flows
- Differentiate between alternative CCS configurations for a given application

Unit 2: Carbon Utilization and Conversion

Outcome

- Explain current and emerging CO₂ utilization pathways and their potential relevance to Canadian industries

Objectives

- Explain how CCS contributes to global CO₂ emissions reduction.
- Describe current uses of CO₂, including enhanced oil recovery (EOR), and how each process works at a basic level.
- Describe emerging carbon-conversion technologies and their potential benefits or limitations.
- Identify CO₂ emissions reduction applications relevant to the Canadian industry market
- Identify key considerations for the suitability of one CO₂ utilization pathway for a selected Canadian sector
- Match CO₂ utilization pathways to appropriate industrial contexts based on basic criteria (e.g., scale, purity, location)

Course Outline



- Explain why certain CO₂ utilization pathways are more viable in specific industrial contexts

Unit 3: The Role of CCS in Canada

Outcome

- Analyze the role of CCS in Canada's decarbonization strategy, including existing projects, sectoral opportunities, and policy drivers.

Objectives

- Explain why CCS is strategically important to Canada's emissions-intensive sectors.
- Describe how CCS integrates into sectors currently implementing it.
- Summarize key features of existing Canadian CCS projects (e.g., location, technology type, scale).
- Describe the general benefits and challenges associated with CCS
- Explain the basic economic factors influencing CCS deployment
- Describe likely pathways for CCS expansion in Canada, referencing policy, infrastructure, or technological drivers.
- Explain how Canadian climate policies support or influence CCS deployment
- Interpret project-specific success factors and constraints in Canadian CCS case examples

Unit 4: The Socio-Economic Impacts of Developing Canada's CCS Sector

Outcome

- Interpret the socio-economic impacts of CCS development, including workforce implications and Indigenous participation.

Objectives

- Explain how socio-economic impacts are assessed in CCS project development
- Identify workforce and employment implications across CCS project phases
- Describe the importance of Indigenous participation and rights-holder engagement
- Describe examples of engagement practices in Canadian CCS projects.
- Identify potential concerns and engagement priorities in a CCS project case

Contact Information:

For more information about this course or others, please contact:

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