

V1  
April 2024

# CARBON CAPTURE AND STORAGE

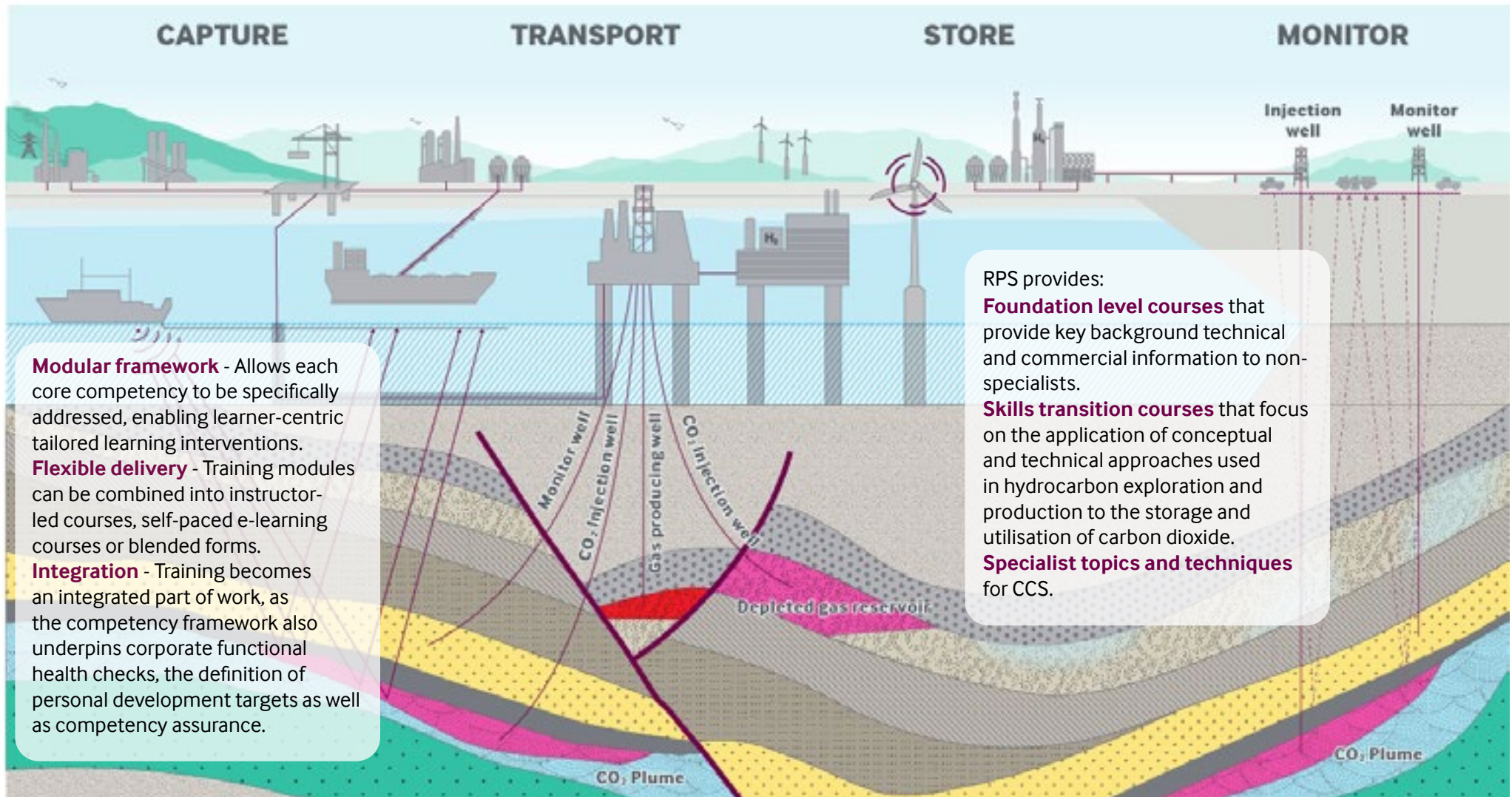
Meeting the demand for the development of skills and knowledge relevant to CCS

CCS curriculum, instructor led and self-paced e-learning courses

CAPABILITY  
DEVELOPMENT FOR THE  
**ENERGY SECTOR**

# CORPORATE CAPABILITY AND INDIVIDUAL SKILLS DEVELOPMENT FOR CARBON CAPTURE AND STORAGE (CCS)

Flexible and adaptable training options to meet the requirements for the energy sector.



# CARBON CAPTURE AND STORAGE (CCS) CURRICULUM

## GENERAL COURSES - INSTRUCTOR LED

### Foundational Understanding for CCS and Hydrogen Underground Storage

The course provides a practical introduction to CCS as a potentially effective technology for the reduction of CO<sub>2</sub> emissions from power generation units or chemical processing plants. The course includes an understanding of how to evaluate the economics of CCS projects and the future outlook of CCS worldwide.

**Instructors:** Srikanta Mishra

**Code:** N535 | **Duration:** 4 sessions or 2 days

**Skill level:** Foundation

[MORE INFO](#)

### Repurposing Subsurface Petroleum Skills for CCUS

This course empowers attendees to develop and apply their skills to Carbon Capture Utilization and Storage (CCUS). Attendees will be guided through the lifecycle of a CCUS project with an emphasis on key concepts, processes, and workflows with a focus will be on developing the geoscience and engineering skills needed.

**Instructors:** Alex Bump, Seyyed Hosseini, Katherine Romanak

**Code:** N538 | **Duration:** 5 sessions or 3 days

**Skill level:** Skilled

[MORE INFO](#)

### Subsurface Characterization, Screening and Site Selection for Geologic CO<sub>2</sub> Storage Sites

This course empowers attendees to develop and apply their skills to the growing industry of Carbon Capture Utilization and Storage. Attendees will be guided through the subsurface characterization and risk assessment of a storage site. Focus will be on the geologic needs for site definition, screening and development.

**Instructors:** Susan Hovorka

**Code:** N549 | **Duration:** 3 sessions or 2 days

**Skill level:** Skilled

[MORE INFO](#)

### Carbon Capture and Storage for Geoscientists and Engineers

This course will provide participants with awareness and understanding of the subsurface needs of CCS projects including subsurface CO<sub>2</sub> storage volumetrics, CO<sub>2</sub> flow away from injector wells, the objective of permanent and safe storage of CO<sub>2</sub>, and the key issues of well design and reservoir depth, lithology, quality, and architecture.

**Instructors:** Richard Worden

**Code:** N565 | **Duration:** 5 sessions or 3 days

**Skill level:** Foundation

[MORE INFO](#)

### Outcrop Analogues for CO<sub>2</sub> Storage (Devon and Dorset, UK)

Using outcrop studies, participants will consider the effects of reservoir geometry, porosity, permeability, and geomechanical properties on CO<sub>2</sub> flow patterns, storage, injectivity, reservoir strength, and behaviour at high fluid pressure. Analogues to top-seals for CCS sites will be considered, plus fault reactivation at elevated CO<sub>2</sub> pressure, well design, and completions strategies.

**Instructors:** Howard Johnson, Richard Worden

**Code:** N577 | **Duration:** 5 Day Field Course

**Skill level:** Skilled

[MORE INFO](#)

### The Geoscience of CCS Using Virtual 3D Outcrop Analogues and Virtual Core

This course will equip geoscientists and petroleum engineers to explore for the most valuable CCS opportunities and define their value more effectively, leveraging applicable best practices from hydrocarbon industry, as well as key lessons learned from CCS projects. Participants will learn to evaluate storage resource leads, including risks, opportunities, and uncertainties.

**Instructors:** Tip Meckel, Jurriaan Reijs

**Code:** N586 | **Duration:** 3 sessions or 2 days

**Skill level:** Skilled

[MORE INFO](#)

## GENERAL COURSES - INSTRUCTOR LED

### The Economics of CCS Projects

This course will look at the factors likely to affect the emergence of a global "market or commodity price" for the transport and storage of CO<sub>2</sub>.

**Instructors:** Andy Kirchin

**Code:** N668 | **Duration:** 2 sessions or 1 day

**Skill level:** Foundation

[MORE INFO](#)



# GENERAL COURSES - SELF-PACED E-LEARNING

## Fundamentals of CCS

This course provides participants with awareness and understanding of the subsurface needs of CCS projects. It will establish basics such as how much CCS is needed to make a difference to global warming and explore what types of CO<sub>2</sub> injection have already happened including dedicated long-term CCS projects, pilot projects and CO<sub>2</sub>-enhanced oil recovery projects.

**Code:** EC003 | **Duration:** 5 hours

**Skill level:** Foundation

[MORE INFO](#)

## Geological Storage of CO<sub>2</sub>

This course provides participants with understanding of geological subsurface CO<sub>2</sub> storage volumetrics, CO<sub>2</sub> flow in the subsurface away from injector wells, the objective of permanent and safe storage of CO<sub>2</sub>. It also covers the key issues of reservoir depth, well design, reservoir lithology, reservoir quality, and reservoir architecture.

**Code:** EC004 | **Duration:** 5 hours

**Skill level:** Foundation

[MORE INFO](#)

## Behaviours of CO<sub>2</sub> in Reservoirs

The course addresses CO<sub>2</sub> as a fluid phase and the key question of CO<sub>2</sub> storage efficiency. The course will address the rate of CO<sub>2</sub> injection and the role reservoir permeability. The all-important issue of the geomechanical effects of CO<sub>2</sub> injection and feedbacks between induced mineral dissolution and rock strength and other rock properties will be addressed.

**Code:** EC005 | **Duration:** 6 hours

**Skill level:** Foundation

[MORE INFO](#)

## Monitoring CO<sub>2</sub> Storage

This course considers the range of potential leakage mechanisms that need to be assessed. It will include a detailed consideration of the monitoring strategies available to assure the safety and integrity of the CO<sub>2</sub> storage site.

**Code:** EC006 | **Duration:** 4 hours

**Skill level:** Foundation

[MORE INFO](#)

## The Geoscience of CO<sub>2</sub> Storage

This package of Carbon Capture and Storage (CCS) self-paced e-learning courses will provide geoscientists and engineers with an awareness and understanding of subsurface CO<sub>2</sub> storage, CO<sub>2</sub> flow in the subsurface, and monitoring of the CO<sub>2</sub> storage site. It addresses the key issues of reservoir depth, well design, reservoir lithology, and quality.

**Code:** EP001 | **Duration:** 20 hours

**Skill level:** Foundation

[MORE INFO](#)



## SPECIALIST COURSES - INSTRUCTOR LED

### Reservoir Modelling for Storage

This course will summarise the unique issues when modelling for storage. Participants will learn to consider fluid properties, heterogeneity, geomechanics, seismic monitoring, and scale. Modelling the 'storage complex' requires models that encompass not just the target reservoir, but also the surrounding rock volumes where the injected fluid plume is expected to migrate to.

**Instructors:** Tim Wynn

**Code:** N548 | **Duration:** 5 sessions or 3 days

**Skill level:** Foundation

[MORE INFO](#)

### Monitoring Geologic CO<sub>2</sub> Storage Sites

Monitoring geological CO<sub>2</sub> storage sites is a critical element of a CCS project and is generally required over all phases of a project and throughout the entire stratigraphy from reservoir to surface. The choice of tools and approach is highly specific to site conditions, project goals and regulatory requirements.

**Instructors:** Susan Hovorka, Katherine Romanak

**Code:** N553 | **Duration:** 3 sessions or 2 days

**Skill level:** Foundation

[MORE INFO](#)

### Transforming 60-years of CO<sub>2</sub>-EOR Experience into Shale Oil Recovery and CO<sub>2</sub> Sequestration

This course provides clear, concise and practical information for understanding and implementing the CO<sub>2</sub> enhanced oil recovery into unconventional reservoirs. The recovery discussions will be complemented with technical discussions on the depleted wells for CO<sub>2</sub> sequestration and carbon credit.

**Instructors:** Yucel Akkutlu

**Code:** N555 | **Duration:** 3 sessions or 6 days

**Skill level:** Skilled

[MORE INFO](#)

### Understanding Faults and Fault Rupture – Applications to Fluid Trapping, Pressure Containment, and Induced Seismicity for Hydrocarbons and CCS (Utah, USA)

This course provides an analysis-level treatment of fault geometry, characterisation of trap effectiveness, and assessment of rupture hazard with application to hydrocarbon exploration, reservoir development and management, fluid pressure containment analysis for CCS, and induced seismicity hazard assessment.

**Instructors:** Peter Hennings, Robert Krantz

**Code:** N579 | **Duration:** 5 Day Field Course

**Skill level:** Skilled

[MORE INFO](#)

### Storage Exploration – Screening and Selection of CO<sub>2</sub> Sites

This course considers the systematic evaluation of regional structure and stratigraphy to identify potential sites for geological storage of CO<sub>2</sub>, beginning with a wide range CCS development concepts, potentially encompassing onshore or offshore, new or adaptation of existing infrastructure and open aquifers as well as closed structures.

**Instructors:** Jim Lorsong, Pete Smith

**Code:** N584 | **Duration:** 3 sessions or 2 days

**Skill level:** Skilled

[MORE INFO](#)

### CO<sub>2</sub> Containment and Storage Monitoring

The course considers physical mechanisms of stabilisation of injected CO<sub>2</sub>, as well as potential geological migration pathways. It considers design of an integrated, cost-effective monitoring programme to address site-specific subsurface and well CO<sub>2</sub> containment risks.

**Instructors:** Jim Lorsong

**Code:** N585 | **Duration:** 3 sessions or 2 days

**Skill level:** Skilled

[MORE INFO](#)

## SPECIALIST COURSES - INSTRUCTOR LED

### Geomechanics for CCS Projects

Starting with some basics of geomechanics and working towards description and examples of sophisticated geomechanical modelling in the context of CCS, this course outlines the importance of geomechanics in CCS projects: caprock integrity, fault reactivation, induced seismicity, fracture influence on reservoir flow, reservoir management, drilling and completion parameters.

**Instructors:** Kes Heffer, Nick Koutsabeloulis

**Code:** N590 | **Duration:** 4 sessions or 2 days

**Skill level:** Skilled

[MORE INFO](#)

### Geochemistry of CCS: Reservoirs, Seals and the Engineered Environment

The geochemistry of saline aquifers, depleted oil/gas fields and CO<sub>2</sub> are considered alongside the reactions of CO<sub>2</sub> with different reservoir rock minerals and cements. The course includes geochemical modelling, reactions within well bores and the monitoring of CCS sites.

**Instructors:** Richard Worden

**Code:** N591 | **Duration:** 4 sessions or 2 days

**Skill level:** Skilled

[MORE INFO](#)

### Well Engineering for CO<sub>2</sub> Storage Applications

This course covers the design specifics of CO<sub>2</sub> injection wells. Such wells may be existing or new wells which need to be designed with the challenges of CO<sub>2</sub> injection in mind. The design includes the casing, cement, completion and all associated equipment. The challenges covered included potentially highly corrosive (to metals and cements) fluids, large temperature changes associated with potential phase changes.

**Instructors:** Jonathan Bellarby

**Code:** N592 | **Duration:** 5 sessions or 3 days

**Skill level:** Skilled

[MORE INFO](#)

### Reservoir Characterisation and Simulation for CCS

A course that considers the geological features of storage sites, focussing on the heterogeneity and presence of faults which can lead to complex flow patterns. Flow simulation model objectives cover storage capacity, integrity assessment, development planning and operational monitoring.

**Instructors:** Andy Woods, Pete Smith

**Code:** N593 | **Duration:** 3 sessions or 2 days

**Skill level:** Skilled

[MORE INFO](#)

### CO<sub>2</sub> Plume Behaviour in a Reservoir

This course explores the controls on the flow of a CO<sub>2</sub> plume in a saline aquifer, the fraction of pore space occupied and the rate of dissolution in brine. It covers the controls on the migration of CO<sub>2</sub> in the post-injection phase and modelling of how far the CO<sub>2</sub> will spread.

**Instructors:** Andy Woods

**Code:** N594 | **Duration:** 2 sessions or 1 day

**Skill level:** Skilled

[MORE INFO](#)



# SPECIALIST COURSES - SELF-PACED E-LEARNING

## Petrophysics for CCS

This course considers the properties of carbon dioxide, contrasts its behaviour with that of methane and the interactions between CO<sub>2</sub> and water in an aquifer. There is a review of some of the properties of CO<sub>2</sub> that affect how different wireline logs respond to it, in particular the significant effects that the gas has on sonic and neutron log responses.

**Code:** EC007 | **Duration:** 7 hours

**Skill level:** Foundation

[MORE INFO](#)

## Storage Exploration – Screening and Selection of CO<sub>2</sub> Sites

This course considers the systematic evaluation of regional structure and stratigraphy to identify potential sites for geological storage of CO<sub>2</sub>, beginning with a wide range of CCS development concepts, potentially encompassing onshore or offshore, new or adaptation of existing infrastructure and open aquifers as well as closed structures.

**Code:** EC029

**Skill level:** Skilled

**IN DEVELOPMENT**

## CO<sub>2</sub> Containment and Storage Monitoring

The course considers physical mechanisms of stabilisation of injected CO<sub>2</sub>, as well as potential geological migration pathways. It considers design of an integrated, cost-effective monitoring programme to address site-specific subsurface and well CO<sub>2</sub> containment risks.

**Code:** EC030

**Skill level:** Skilled

**IN DEVELOPMENT**

## Geomechanics for CCS Projects

Starting with some basics of geomechanics and working towards description and examples of sophisticated geomechanical modelling in the context of CCS, this course outlines the importance of geomechanics in CCS projects: caprock integrity, fault reactivation, induced seismicity, fracture influence on reservoir flow, reservoir management, drilling and completion parameters.

**Code:** EC031 | **Duration:** 6 hours

**Skill level:** Skilled

[MORE INFO](#)

## Geochemistry of CCS Projects

The chemistry of saline aquifers, depleted oil/gas fields and CO<sub>2</sub> are considered alongside the reactions of CO<sub>2</sub> with different reservoir rock minerals and cements. The course includes geochemical modelling, reactions within well bores and the monitoring of CCS sites.

**Code:** EC032

**Skill level:** Skilled

**IN DEVELOPMENT**

## Well Engineering for CO<sub>2</sub> Storage Applications

This course covers the design specifics of CO<sub>2</sub> injection wells. Such wells may be existing or new wells which need to be designed with the challenges of CO<sub>2</sub> injection in mind. The design includes the casing, cement, completion and all associated equipment.

**Code:** E033

**Skill level:** Skilled

**IN DEVELOPMENT**



## SPECIALIST COURSES - SELF-PACED E-LEARNING

### Reservoir Characterisation and Simulation for CCS

Course considers the geological features of storage sites, focussing on the heterogeneity and presence of faults which can lead to complex flow patterns. Flow simulation model objectives cover storage capacity, integrity assessment, development planning and operational monitoring.

**Code:** EC034

**Skill level:** Skilled

**IN DEVELOPMENT**

### CO<sub>2</sub> Plume Behaviour in a Reservoir

This course considers the controls on the flow of a CO<sub>2</sub> plume in a saline aquifer, the fraction of pore space occupied and the rate of dissolution in brine. It covers the controls on the migration of CO<sub>2</sub> in the post-injection phase and modelling of how far the CO<sub>2</sub> will spread.

**Code:** EC035

**Skill level:** Skilled

**IN DEVELOPMENT**

## INTERACTIVE DEMOS

### Fundamentals of CCS

### CO<sub>2</sub> in the Atmosphere



# COURSE ACCESS

## Scheduled courses

RPS delivers field, classroom and online courses focusing on core skills development and current challenges facing the E&P industry. Courses are delivered by instructors recognised as world class subject matter experts in their field, including industry leaders, professors and distinguished lecturers.

RPS' scheduled courses can be accessed through your corporate Nautilus Training Alliance (NTA) Membership or courses can be booked on-demand as required online by credit card or invoice.

## Self-paced e-learning

Offered independently or as part of a blended learning program, RPS' bespoke e-learning solutions immerse learners in a rich variety of content and interactive media to provide a personalised learning experience. By providing access to the RPS e-learning catalogue or producing custom content, RPS can help organisations leverage technology to engage their learners in a dynamic and exciting digital learning environment.

With each new course, you will find an overview of what the course covers and what's associated with the specific course elements in the introductory module page. Specific competencies are addressed through videos, presentation materials, interactive quizzes, 3D models, text and voice-overs. Each module is designed for flexible learning and allows for variable periods of interaction with content to suit individual needs.

Courses can be accessed wither via a corporate license or can be booked on-demand as required online by credit card or invoice.

## Inhouse courses

The same best in class virtual, field and classroom courses focusing on core skills development and current challenges but delivered inhouse for groups typically of 10 to 20 participants.

Courses delivered by instructors recognised as world class subject matter experts.

**Designed to meet technical requirements** – Learning events are tailored to address learning outcomes most relevant to the team in the workplace. Can include variations across all subject areas and specifics to address cross-disciplinary challenges. Established courses can be delivered off-the-shelf or customised to meet specific technical focus and level

**Flexible locations** – Either in your office, or virtually to provide training for participants in multiple locations

**Flexible schedules** – Delivered in continuous sessions, or distributed over a longer period of time to suit operational requirements

**Efficient** - Team focused training is a cost effective means of learning and development for technical staff with shared technical challenges



Book a course or make an Inhouse course enquiry:  
[training.rpsgroup.com/inhouse-course-enquiry](https://training.rpsgroup.com/inhouse-course-enquiry)

# BLENDED LEARNING

A learning approach of building knowledge through interactive on-line modules with skills development in instructor-led virtual, classroom or field based workshops, exercises and scenario-based activities.

## 1 WHY

- Self-paced learning of foundation knowledge and skills followed by instructor-led sessions which focus on practical applications provides an efficient and effective blended pathway.

## 2 WHAT

- Based on the requirements of the organisation and the needs of the individual.
- Designed for cohorts of staff and scheduled as required.
- Self-paced learning modules are available as required.
- Instructor-led sessions may be in-person or virtual.
- Workshops concentrate on integrating knowledge and developing applications of skills through scenario-based exercises.

## 3 WHO

- Our approach is suitable for cohorts of staff in a wide range of roles in different sizes of organisation.
- Applicable to organisations or discipline sectors of all sizes and is particularly suitable for a distributed workforce.

## 4 HOW

### MODULAR

Allows creation of unique training pathways through on-line learning whilst retaining an integrated approach to skills development through classroom and field workshops.

### FLEXIBLE

Customised content is accompanied by flexibility of scheduling, fitting in with work patterns to be operationally friendly.

### ADAPTABLE

Methods of delivery are adaptable, with content provided as self-paced learning modules (where available) and/or instructor-led sessions in person or virtually.

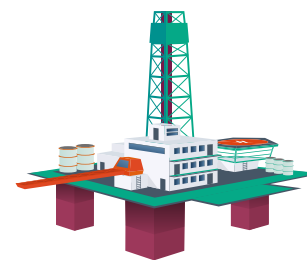
### COST EFFECTIVE

More cost efficient than conventional classroom courses and more effective than on-line training in isolation.

## 5 SUBJECT AREAS



Carbon Management and Gas Transition



Oil and Gas



Sustainable Heat - Geothermal



Environmental, Social and Governance (ESG)

# RPS | TRAINING

Our goal is to collaborate with our customers to develop the competencies and capability of their workforce through integrated learning that supports their roles and promotes individual development driving organisational excellence.

Our expertise brings flexible and scalable solutions from a diverse energy portfolio in the design, development of technical content and knowledge-based programmes delivered by expert instructors. Our technical and learning expertise help organisations develop the competencies, skills and knowledge they need to fulfill their collective potential.

The stand-out for our clients is that we use our deep expertise to solve problems that matter, making them easy to understand and we're easy to work with – Making complex easy.

[www.training.rpsgroup.com](http://www.training.rpsgroup.com)

## CONTACT

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**NAUTILUS** 

