Subsea Control Systems and Digital Integrity

GExperts Learning Academy | PC-X14 | PC | 12-18 weeks

Course overview

12-18 weeks PC programme focused on Subsea Control Systems and Digital Integrity, using energy-sector cases and applied decisions.

Designed for: Experienced professionals

Learning outcomes

- Explain core principles and terminology for Subsea Control Systems and Digital Integrity.
- Interpret an applied case using evidence and stated assumptions.
- Identify risks, safeguards, role boundaries and escalation points.
- Prepare a clear recommendation for a multidisciplinary audience.

Course guide

Work through each module objective, lesson and teaching note, complete the applied activity and assessment, then use the separate Academy practice page for practice questions and answer feedback.

Separate practice questions:
https://www.globalexpertsconsultoria.com/training/academy/courses/questions/?course=PC-X14

Academic and certification status

Draft learning resource for study and review. It does not confer accreditation, external certification, a regulated qualification, professional licence, safety-critical competence or site authorisation. Confirm approvals, current laws, standards, approved procedures and awarding-body requirements before delivery.

Module 1: Umbilicals and subsea control systems

Learning objectives

- Explain umbilicals and subsea control systems, interpret a case, select appropriate controls and justify a documented decision.

Lessons

1. Purpose and key terms of Umbilicals and subsea control systems
2. Systems and operating context
3. Evidence, assumptions and decision gates
4. Hazards, safeguards and escalation
5. Applied case: Subsea Control Systems and Digital Integrity

Detailed teaching notes

Teaching notes

Core explanation. Umbilicals transmit combinations of power, communications, hydraulic service and chemicals. Subsea controls command and monitor equipment. Use a signal-and-energy diagram to separate commands, feedback and physical actuation.

Decision logic. Control philosophy must address loss of power, communications and hydraulic supply, plus the intended safe response. Check compatibility and redundancy across surface and subsea equipment. A command acknowledgement does not necessarily prove final valve position.

Worked example. A control command is received, but independent position feedback disagrees. Investigate rather than assume successful actuation.

Facilitator prompts. Ask learners to distinguish verified facts from assumptions, identify who has decision authority, name stop-work triggers and state what evidence could change their recommendation. Compare technical, HSE, commercial and community perspectives.

Activity. Trace one command path and identify three failure points and their indication.

Model answer guide. Include surface control, communication, power or hydraulic supply and feedback; distinguish received command from achieved state.

Assessment evidence. Score accuracy (30%), use of evidence (20%), safeguards (20%), analysis (20%) and communication (10%).

Applied activity

Trace one command path and identify three failure points and their indication.

Assessment

Formative: 10-question practice quiz with answer feedback

Summative: Applied decision brief or practical case assessed against the rubric; proposed pass mark 70%, subject to academic approval.

Practice

Use the separate Academy practice questions and answer key page for this module.

Module 2: Industrial instrumentation

Learning objectives

- Explain industrial instrumentation, interpret a case, select appropriate controls and justify a documented decision.

Lessons

1. Purpose and key terms of Industrial instrumentation
2. Systems and operating context
3. Evidence, assumptions and decision gates
4. Hazards, safeguards and escalation
5. Applied case: Subsea Control Systems and Digital Integrity

Detailed teaching notes

Teaching notes

Core explanation. Sensors and transmitters convert process conditions into signals. Teach range, span, accuracy, calibration and measurement uncertainty. Pressure, temperature, flow and level measurements use different principles and installation constraints.

Decision logic. Trace a measurement from process interface through signal conversion to display. Incorrect range or units can mislead control and operations. An apparently stable value may be frozen or invalid. Actual instrument work follows authorised isolation and manufacturer procedures.

Worked example. A 4-20 mA signal represents 0-100 units; 12 mA corresponds to 50 units under a linear mapping.

Facilitator prompts. Ask learners to distinguish verified facts from assumptions, identify who has decision authority, name stop-work triggers and state what evidence could change their recommendation. Compare technical, HSE, commercial and community perspectives.

Activity. Calculate the indicated value at 8 mA and identify assumptions.

Model answer guide. Twenty-five units with linear mapping and a valid signal; check range and status.

Assessment evidence. Score accuracy (30%), use of evidence (20%), safeguards (20%), analysis (20%) and communication (10%).

Applied activity

Calculate the indicated value at 8 mA and identify assumptions.

Assessment

Formative: 10-question practice quiz with answer feedback

Summative: Applied decision brief or practical case assessed against the rubric; proposed pass mark 70%, subject to academic approval.

Practice

Use the separate Academy practice questions and answer key page for this module.

Module 3: Offshore telecommunications

Learning objectives

- Explain offshore telecommunications, interpret a case, select appropriate controls and justify a documented decision.

Lessons

1. Purpose and key terms of Offshore telecommunications
2. Systems and operating context
3. Evidence, assumptions and decision gates
4. Hazards, safeguards and escalation
5. Applied case: Subsea Control Systems and Digital Integrity

Detailed teaching notes

Teaching notes

Core explanation. Offshore communications connect voice, data, control and emergency functions through links with differing bandwidth, latency and availability. Define service requirements before selecting technology. Emergency and operational needs may require resilience independent of business traffic.

Decision logic. Create a dependency map and test loss-of-link scenarios. A redundant link is useful only if common failures are understood. Remote support needs access control and agreed authority. Do not expose real network details in course submissions.

Worked example. Two nominally redundant links share one power supply, creating a common failure point.

Facilitator prompts. Ask learners to distinguish verified facts from assumptions, identify who has decision authority, name stop-work triggers and state what evidence could change their recommendation. Compare technical, HSE, commercial and community perspectives.

Activity. Design a conceptual communications matrix with primary and fallback services.

Model answer guide. Include power, physical diversity, capacity, latency, security and failure response.

Assessment evidence. Score accuracy (30%), use of evidence (20%), safeguards (20%), analysis (20%) and communication (10%).

Applied activity

Design a conceptual communications matrix with primary and fallback services.

Assessment

Formative: 10-question practice quiz with answer feedback

Summative: Applied decision brief or practical case assessed against the rubric; proposed pass mark 70%, subject to academic approval.

Practice

Use the separate Academy practice questions and answer key page for this module.

Module 4: Subsea Control Systems and Digital Integrity: Evidence and Decisi

Learning objectives

- Explain subsea control systems and digital integrity: evidence and decision gates, interpret a case, select appropriate controls and justify a documented decision.

Lessons

1. Purpose and key terms of Subsea Control Systems and Digital Integrity: Evidence and Decision Gates
2. Systems and operating context
3. Evidence, assumptions and decision gates
4. Hazards, safeguards and escalation
5. Applied case: Subsea Control Systems and Digital Integrity

Detailed teaching notes

Teaching notes

Core explanation. Subsea Control Systems and Digital Integrity: Evidence and Decision Gates describes a practical part of Subsea Control Systems and Digital Integrity. Learners connect the principles to asset performance, people, operational risk, project value and local context.

Decision logic. Review the objective, evidence, limits, interfaces and applicable controls for subsea control systems and digital integrity: evidence and decision gates. Decisions require current information, role-appropriate authority, competent review and documented assumptions.

Worked example. Use an applied Namibia-relevant case in which a team plans subsea control systems and digital integrity: evidence and decision gates while balancing safety, integrity, schedule, cost, environmental protection and local capability.

Facilitator prompts. Ask learners to distinguish verified facts from assumptions, identify who has decision authority, name stop-work triggers and state what evidence could change their recommendation. Compare technical, HSE, commercial and community perspectives.

Activity. Prepare a decision brief for subsea control systems and digital integrity: evidence and decision gates: scope, evidence, assumptions, hazards, safeguards, owner, decision gate and escalation trigger.

Model answer guide. A sound response defines scope; uses current, traceable evidence; applies approved requirements and controls; records assumptions; assigns competent owners; checks interfaces; and communicates a measurable decision with an escalation path.

Assessment evidence. Score accuracy (30%), use of evidence (20%), safeguards (20%), analysis (20%) and communication (10%).

Applied activity

Prepare a decision brief for subsea control systems and digital integrity: evidence and decision gates: scope, evidence, assumptions, hazards, safeguards, owner, decision gate and escalation trigger.

Assessment

Formative: 10-question practice quiz with answer feedback

Summative: Applied decision brief or practical case assessed against the rubric; proposed pass mark 70%, subject to academic approval.

Practice

Use the separate Academy practice questions and answer key page for this module.

Module 5: SCADA DCS and integrated control systems

Learning objectives

- Explain scada dcs and integrated control systems, interpret a case, select appropriate controls and justify a documented decision.

Lessons

1. Purpose and key terms of SCADA DCS and integrated control systems
2. Systems and operating context
3. Evidence, assumptions and decision gates
4. Hazards, safeguards and escalation
5. Applied case: Subsea Control Systems and Digital Integrity

Detailed teaching notes

Teaching notes

Core explanation. Control systems acquire signals, execute logic and support operator actions. SCADA, DCS and integrated control architectures differ by context; safety functions require appropriate separation and assurance. Explain sensor, controller, final element and human interface.

Decision logic. Alarm and control design must match process needs and human capability. More alarms do not necessarily improve safety. Changes to logic require controlled review, testing and approval. This course uses simulation only and provides no live-system modification instructions.

Worked example. An alarm floods the operator screen during a simulated upset, obscuring the initiating condition.

Facilitator prompts. Ask learners to distinguish verified facts from assumptions, identify who has decision authority, name stop-work triggers and state what evidence could change their recommendation. Compare technical, HSE, commercial and community perspectives.

Activity. Map a control loop and evaluate an alarm list for prioritisation questions.

Model answer guide. Identify measurement, logic, final element and feedback, with rationalised alarms and change control.

Assessment evidence. Score accuracy (30%), use of evidence (20%), safeguards (20%), analysis (20%) and communication (10%).

Applied activity

Map a control loop and evaluate an alarm list for prioritisation questions.

Assessment

Formative: 10-question practice quiz with answer feedback

Summative: Applied decision brief or practical case assessed against the rubric; proposed pass mark 70%, subject to academic approval.

Practice

Use the separate Academy practice questions and answer key page for this module.

Module 6: Subsea Control Systems and Digital Integrity: Data and Performan

Learning objectives

- Explain subsea control systems and digital integrity: data and performance, interpret a case, select appropriate controls and justify a documented decision.

Lessons

1. Purpose and key terms of Subsea Control Systems and Digital Integrity: Data and Performance
2. Systems and operating context
3. Evidence, assumptions and decision gates
4. Hazards, safeguards and escalation
5. Applied case: Subsea Control Systems and Digital Integrity

Detailed teaching notes

Teaching notes

Core explanation. Subsea Control Systems and Digital Integrity: Data and Performance describes a practical part of Subsea Control Systems and Digital Integrity. Learners connect the principles to asset performance, people, operational risk, project value and local context.

Decision logic. Review the objective, evidence, limits, interfaces and applicable controls for subsea control systems and digital integrity: data and performance. Decisions require current information, role-appropriate authority, competent review and documented assumptions.

Worked example. Use an applied Namibia-relevant case in which a team plans subsea control systems and digital integrity: data and performance while balancing safety, integrity, schedule, cost, environmental protection and local capability.

Facilitator prompts. Ask learners to distinguish verified facts from assumptions, identify who has decision authority, name stop-work triggers and state what evidence could change their recommendation. Compare technical, HSE, commercial and community perspectives.

Activity. Prepare a decision brief for subsea control systems and digital integrity: data and performance: scope, evidence, assumptions, hazards, safeguards, owner, decision gate and escalation trigger.

Model answer guide. A sound response defines scope; uses current, traceable evidence; applies approved requirements and controls; records assumptions; assigns competent owners; checks interfaces; and communicates a measurable decision with an escalation path.

Assessment evidence. Score accuracy (30%), use of evidence (20%), safeguards (20%), analysis (20%) and communication (10%).

Applied activity

Prepare a decision brief for subsea control systems and digital integrity: data and performance: scope, evidence, assumptions, hazards, safeguards, owner, decision gate and escalation trigger.

Assessment

Formative: 10-question practice quiz with answer feedback

Summative: Applied decision brief or practical case assessed against the rubric; proposed pass mark 70%, subject to academic approval.

Practice

Use the separate Academy practice questions and answer key page for this module.

Module 7: Subsea Control Systems and Digital Integrity: Applied Case

Learning objectives

- Explain subsea control systems and digital integrity: applied case, interpret a case, select appropriate controls and justify a documented decision.

Lessons

1. Purpose and key terms of Subsea Control Systems and Digital Integrity: Applied Case
2. Systems and operating context
3. Evidence, assumptions and decision gates
4. Hazards, safeguards and escalation
5. Applied case: Subsea Control Systems and Digital Integrity

Detailed teaching notes

Teaching notes

Core explanation. Subsea Control Systems and Digital Integrity: Applied Case describes a practical part of Subsea Control Systems and Digital Integrity. Learners connect the principles to asset performance, people, operational risk, project value and local context.

Decision logic. Review the objective, evidence, limits, interfaces and applicable controls for subsea control systems and digital integrity: applied case. Decisions require current information, role-appropriate authority, competent review and documented assumptions.

Worked example. Use an applied Namibia-relevant case in which a team plans subsea control systems and digital integrity: applied case while balancing safety, integrity, schedule, cost, environmental protection and local capability.

Facilitator prompts. Ask learners to distinguish verified facts from assumptions, identify who has decision authority, name stop-work triggers and state what evidence could change their recommendation. Compare technical, HSE, commercial and community perspectives.

Activity. Prepare a decision brief for subsea control systems and digital integrity: applied case: scope, evidence, assumptions, hazards, safeguards, owner, decision gate and escalation trigger.

Model answer guide. A sound response defines scope; uses current, traceable evidence; applies approved requirements and controls; records assumptions; assigns competent owners; checks interfaces; and communicates a measurable decision with an escalation path.

Assessment evidence. Score accuracy (30%), use of evidence (20%), safeguards (20%), analysis (20%) and communication (10%).

Applied activity

Prepare a decision brief for subsea control systems and digital integrity: applied case: scope, evidence, assumptions, hazards, safeguards, owner, decision gate and escalation trigger.

Assessment

Formative: 10-question practice quiz with answer feedback

Summative: Applied decision brief or practical case assessed against the rubric; proposed pass mark 70%, subject to academic approval.

Practice

Use the separate Academy practice questions and answer key page for this module.

Module 8: Subsea Control Systems and Digital Integrity: Communication and

Learning objectives

- Explain subsea control systems and digital integrity: communication and escalation, interpret a case, select appropriate controls and justify a documented decision.

Lessons

1. Purpose and key terms of Subsea Control Systems and Digital Integrity: Communication and Escalation

2. Systems and operating context

3. Evidence, assumptions and decision gates

4. Hazards, safeguards and escalation

5. Applied case: Subsea Control Systems and Digital Integrity

Detailed teaching notes

Teaching notes

Core explanation. Subsea Control Systems and Digital Integrity: Communication and Escalation describes a practical part of Subsea Control Systems and Digital Integrity. Learners connect the principles to asset performance, people, operational risk, project value and local context.

Decision logic. Review the objective, evidence, limits, interfaces and applicable controls for subsea control systems and digital integrity: communication and escalation. Decisions require current information, role-appropriate authority, competent review and documented assumptions.

Worked example. Use an applied Namibia-relevant case in which a team plans subsea control systems and digital integrity: communication and escalation while balancing safety, integrity, schedule, cost, environmental protection and local capability.

Facilitator prompts. Ask learners to distinguish verified facts from assumptions, identify who has decision authority, name stop-work triggers and state what evidence could change their recommendation. Compare technical, HSE, commercial and community perspectives.

Activity. Prepare a decision brief for subsea control systems and digital integrity: communication and escalation: scope, evidence, assumptions, hazards, safeguards, owner, decision gate and escalation trigger.

Model answer guide. A sound response defines scope; uses current, traceable evidence; applies approved requirements and controls; records assumptions; assigns competent owners; checks interfaces; and communicates a measurable decision with an escalation path.

Assessment evidence. Score accuracy (30%), use of evidence (20%), safeguards (20%), analysis (20%) and communication (10%).

Applied activity

Prepare a decision brief for subsea control systems and digital integrity: communication and escalation: scope, evidence, assumptions, hazards, safeguards, owner, decision gate and escalation trigger.

Assessment

Formative: 10-question practice quiz with answer feedback

Summative: Applied decision brief or practical case assessed against the rubric; proposed pass mark 70%, subject to academic approval.

Practice

Use the separate Academy practice questions and answer key page for this module.

Module 9: Subsea Control Systems and Digital Integrity: Knowledge Check

Learning objectives

- Explain subsea control systems and digital integrity: knowledge check, interpret a case, select appropriate controls and justify a documented decision.

Lessons

1. Purpose and key terms of Subsea Control Systems and Digital Integrity: Knowledge Check
2. Systems and operating context
3. Evidence, assumptions and decision gates
4. Hazards, safeguards and escalation
5. Applied case: Subsea Control Systems and Digital Integrity

Detailed teaching notes

Teaching notes

Core explanation. Subsea Control Systems and Digital Integrity: Knowledge Check describes a practical part of Subsea Control Systems and Digital Integrity. Learners connect the principles to asset performance, people, operational risk, project value and local context.

Decision logic. Review the objective, evidence, limits, interfaces and applicable controls for subsea control systems and digital integrity: knowledge check. Decisions require current information, role-appropriate authority, competent review and documented assumptions.

Worked example. Use an applied Namibia-relevant case in which a team plans subsea control systems and digital integrity: knowledge check while balancing safety, integrity, schedule, cost, environmental protection and local capability.

Facilitator prompts. Ask learners to distinguish verified facts from assumptions, identify who has decision authority, name stop-work triggers and state what evidence could change their recommendation. Compare technical, HSE, commercial and community perspectives.

Activity. Prepare a decision brief for subsea control systems and digital integrity: knowledge check: scope, evidence, assumptions, hazards, safeguards, owner, decision gate and escalation trigger.

Model answer guide. A sound response defines scope; uses current, traceable evidence; applies approved requirements and controls; records assumptions; assigns competent owners; checks interfaces; and communicates a measurable decision with an escalation path.

Assessment evidence. Score accuracy (30%), use of evidence (20%), safeguards (20%), analysis (20%) and communication (10%).

Applied activity

Prepare a decision brief for subsea control systems and digital integrity: knowledge check: scope, evidence, assumptions, hazards, safeguards, owner, decision gate and escalation trigger.

Assessment

Formative: 10-question practice quiz with answer feedback

Summative: Applied decision brief or practical case assessed against the rubric; proposed pass mark 70%, subject to academic approval.

Practice

Use the separate Academy practice questions and answer key page for this module.

Module 10: Subsea Control Systems and Digital Integrity: Competence Revie

Learning objectives

- Explain subsea control systems and digital integrity: competence review, interpret a case, select appropriate controls and justify a documented decision.

Lessons

1. Purpose and key terms of Subsea Control Systems and Digital Integrity: Competence Review
2. Systems and operating context
3. Evidence, assumptions and decision gates
4. Hazards, safeguards and escalation
5. Applied case: Subsea Control Systems and Digital Integrity

Detailed teaching notes

Teaching notes

Core explanation. Subsea Control Systems and Digital Integrity: Competence Review describes a practical part of Subsea Control Systems and Digital Integrity. Learners connect the principles to asset performance, people, operational risk, project value and local context.

Decision logic. Review the objective, evidence, limits, interfaces and applicable controls for subsea control systems and digital integrity: competence review. Decisions require current information, role-appropriate authority, competent review and documented assumptions.

Worked example. Use an applied Namibia-relevant case in which a team plans subsea control systems and digital integrity: competence review while balancing safety, integrity, schedule, cost, environmental protection and local capability.

Facilitator prompts. Ask learners to distinguish verified facts from assumptions, identify who has decision authority, name stop-work triggers and state what evidence could change their recommendation. Compare technical, HSE, commercial and community perspectives.

Activity. Prepare a decision brief for subsea control systems and digital integrity: competence review: scope, evidence, assumptions, hazards, safeguards, owner, decision gate and escalation trigger.

Model answer guide. A sound response defines scope; uses current, traceable evidence; applies approved requirements and controls; records assumptions; assigns competent owners; checks interfaces; and communicates a measurable decision with an escalation path.

Assessment evidence. Score accuracy (30%), use of evidence (20%), safeguards (20%), analysis (20%) and communication (10%).

Applied activity

Prepare a decision brief for subsea control systems and digital integrity: competence review: scope, evidence, assumptions, hazards, safeguards, owner, decision gate and escalation trigger.

Assessment

Formative: 10-question practice quiz with answer feedback

Summative: Applied decision brief or practical case assessed against the rubric; proposed pass mark 70%, subject to academic approval.

Practice

Use the separate Academy practice questions and answer key page for this module.

Facilitator close-out and resources

Facilitator close-out

Record attendance, assessment evidence, learner support needs, incidents and improvement actions according to approved provider processes. Do not sign learners off for regulated or safety-critical work without the authorised assessment and certification route.

Resources and references

- Supplied GExperts/IUM reference materials; verify reuse rights and currentness.
- Current applicable Namibian legislation, standards and approved site procedures supplied by the provider.
- Case worksheet and instructor slides must be produced and reviewed before course release.