GEXPERTS LEARNING ACADEMY

Fundamentals of Subsea Engineering

System architecture, field development and lifecycle integrity

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Learning outcomes

- Describe core subsea production-system components and interfaces.
- Compare subsea tieback and standalone development concepts against field constraints.
- Identify lifecycle assurance, flow assurance and integrity risks requiring specialist review.

System architecture

- Trace the production path: reservoir → tree → flowline/jumper → manifold → riser → host facility.

- Recognise controls, umbilicals, power, chemical injection, communications and intervention interfaces.

- Distinguish wet-tree subsea systems from dry-tree architectures and their host requirements.

Field development choices

- Screen water depth, distance to host, reservoir profile, fluid properties, seabed conditions and export route.
- Compare tieback, hub and standalone concepts using recovery, cost, schedule, operability and expansion potential.
- Carry uncertainty and abandonment into concept selection; do not rely on a single headline cost.

Equipment and controls

- Trees manage well access and flow; manifolds collect and distribute production/injection streams.

- Pipelines, jumpers, risers and umbilicals form connected mechanical, hydraulic, electrical and data systems.

- Controls architecture, barriers and fail-safe states are safety-critical and require approved engineering.

Flow assurance

- Evaluate hydrate, wax, scale, corrosion, erosion, slugging and solids risks across operating envelopes.
- Select prevention and remediation measures using fluid data, thermal-hydraulic modelling and operating philosophy.
- Plan surveillance, chemical management and restart scenarios before first production.

Installation, commissioning and operations

- Plan vessel, weather, lifting, metrology, ROV and seabed-intervention interfaces.

- Control installation quality, testing, pre-commissioning, system handover and as-built documentation.

- Use integrity management, inspection, monitoring and intervention plans across service life.

Standards, integrity and safety

- DNV-ST-F101 addresses submarine pipeline lifecycle design, construction, operation and abandonment.
- Check applicable editions and companion standards such as DNV-ST-F201 and DNV-ST-F301 for the system scope.
- Apply project-specific verification, materials, corrosion, installation, commissioning, testing and survey requirements.

Applied concept-screening activity

- Teams compare a hypothetical remote offshore discovery with a nearby host tieback and a standalone option.
- List data needed for a concept decision: fluids, reservoir, seabed, host capacity, export, metocean, cost and schedule.
- Build a risk register and identify assurance gates; do not issue a design or operating instruction.

References and scope

- DNV subsea codes: dnv.com/energy/services/subsea-facilities/world-class-codes/ · DNV-ST-F101: dnv.com/energy/standards-guidelines/dnv-st-f101-submarine-pipeline-systems
- Source: supplied Fundamentals of Subsea Engineering training PDF; legacy statistics and dated case claims are excluded pending verification.
- Educational overview only; not an engineering design basis, accredited qualification, external certification or authorisation to operate equipment.