Curriculum

Petroleum Engineering (Offshore, Subsea and Pipeline option)

Faculty of Engineering, Akpakip Oro University (AOU)

Curriculum document: draft for departmental, Faculty and Senate review

Course codes, units and status are provisional until reconciled with the NUC CCMAS

1. Preamble

This curriculum sets out the five-year Bachelor of Engineering programme in Petroleum Engineering (Offshore, Subsea and Pipeline option), offered by the Department of Petroleum Engineering, Faculty of Engineering, Akpakip Oro University (AOU). It is designed to meet the NUC Core Curriculum and Minimum Academic Standards (CCMAS) and the professional requirements for engineering registration in Nigeria.

Course codes, units and compulsory or elective status are provisional and must be reconciled with the official CCMAS before Senate adoption. The CCMAS expansion used here should also be verified against the NUC publication.

2. Aims and Objectives

- Produce petroleum engineers who find, develop and produce oil and gas resources safely and efficiently.
- Offer the Offshore, Subsea and Pipeline option, covering offshore platforms, subsea production systems and pipeline transport.
- Build strong foundations in geoscience, mechanics, fluid flow and thermodynamics.
- Prepare graduates for COREN registration and for employment or postgraduate study.

3. Graduate Competencies

On graduation, students should demonstrate competence in the areas below.

Competency	Expected graduate capability
Geoscience	Interpret rocks, basins and petroleum systems for exploration and development.
Reservoir rock and fluids	Measure and interpret rock and fluid properties for reservoir evaluation.
Reservoir engineering	Analyse reservoir performance, reserves and recovery methods.
Drilling and completions	Design and plan drilling, well completions and stimulation.
Production and flow assurance	Design production systems and manage multiphase flow and flow assurance.
Mechanics and thermo-fluids	Apply mechanics, thermodynamics and fluid mechanics to petroleum systems.
Subsea and pipeline engineering	Design, install and integrity-manage subsea systems and pipelines.
Offshore structures and risers	Assess offshore structures, risers and mooring under environmental loads.
Field development and economics	Appraise and plan field development, including decommissioning.
Safety, environment and professional practice	Demonstrate HSE management, regulatory compliance, ethics and teamwork.

4. Programme Structure

The programme comprises 80 courses and 206 units across ten semesters. The Track column shows whether a course is core (taken by all students) or belongs to a named option.

Track: 'Core' is taken by all students. 'OSP' marks Offshore, Subsea and Pipeline option courses.

Year 1: Engineering Foundations

Semester 1 (First semester)

Code	Course	Units	Track
PET 101	Mathematics I	3	Core
PET 102	General Physics I	3	Core
PET 103	General Chemistry I	2	Core
PET 104	Introductory Engineering	2	Core
PET 105	Introduction to Computing	2	Core
PET 106	Communication in English	2	Core

Code	Course	Units	Track
PET 107	Engineering Laboratory Practicals	1	Core
PET 108	Introduction to Petroleum Engineering	2	Core
	Semester total	**17**	

Semester 2 (Second semester)

Code	Course	Units	Track
PET 109	Mathematics II	3	Core
PET 110	General Physics II	3	Core
PET 111	General Chemistry II	2	Core
PET 112	Engineering Drawing and Graphics	2	Core
PET 113	Programming and Engineering Computation	2	Core
PET 114	Nigerian Peoples and Cultures	2	Core
PET 115	Earth Materials Laboratory	1	Core
PET 116	Engineering Workshop and Safety	2	Core
	Semester total	**17**	

Year 2: Core Engineering

Semester 3 (First semester)

Code	Course	Units	Track
PET 201	Physical Geology	3	Core
PET 202	Engineering Mathematics	3	Core
PET 203	Engineering Mechanics: Statics	3	Core
PET 204	Strength of Materials I	3	Core
PET 205	Thermodynamics I	3	Core
PET 206	Fluid Mechanics I	3	Core
PET 207	Mineralogy and Petrology	2	Core
PET 208	Petroleum Chemistry Fundamentals	2	Core
	Semester total	**22**	

Semester 4 (Second semester)

Code	Course	Units	Track
PET 209	Stratigraphy and Sedimentology	3	Core
PET 210	Numerical Methods for Engineers	3	Core
PET 211	Strength of Materials II	3	Core
PET 212	Thermodynamics II	3	Core
PET 213	Fluid Mechanics II	3	Core
PET 214	Heat Transfer	2	Core
PET 215	Geophysics Fundamentals	2	Core
PET 216	Earth Sciences Laboratory I	1	Core
	Semester total	**20**	

Year 3: Specialist Foundations

Semester 5 (First semester)

Code	Course	Units	Track
PET 301	Petroleum Geology	3	Core
PET 302	Reservoir Rock Properties	3	Core
PET 303	Drilling Engineering I	3	Core
PET 304	Well Logging and Formation Evaluation	3	Core
PET 305	Reservoir Fluid Properties	3	Core
PET 306	Soil Mechanics I	3	Core
PET 307	Engineering Statistics and Research Methods	2	Core
PET 308	Petroleum Laboratory I	2	Core
	Semester total	**22**	

Semester 6 (Second semester)

Code	Course	Units	Track
PET 309	Drilling Engineering II	3	Core
PET 310	Reservoir Engineering I	3	Core
PET 311	Petroleum Production Engineering I	3	Core
PET 312	Fluid Flow in Porous Media	3	Core
PET 313	Pipeline Engineering Fundamentals	3	OSP
PET 314	Offshore Engineering Fundamentals	3	OSP
PET 315	Petroleum Laboratory II	2	Core
PET 316	Engineering Economics	2	Core
	Semester total	**22**	

Year 4: Advanced Design and Industrial Practice

Semester 7 (First semester)

Code	Course	Units	Track
PET 401	Reservoir Engineering II	3	Core
PET 402	Petroleum Production Engineering II	3	Core
PET 403	Well Completion and Stimulation	3	Core
PET 404	Subsea Systems Engineering	3	OSP
PET 405	Pipeline Design and Installation	3	OSP
PET 406	Offshore Structures	3	OSP
PET 407	Flow Assurance	3	OSP
PET 408	Research Project I	2	Core
	Semester total	**23**	

Semester 8 (Second semester)

Code	Course	Units	Track
PET 409	Offshore Drilling Operations	3	OSP
PET 410	Subsea Production Systems	3	OSP
PET 411	Pipeline Integrity and Corrosion Management	3	OSP
PET 412	Reservoir Simulation	3	Core
PET 413	Enhanced Oil Recovery	3	Core
PET 414	Marine Risers and Mooring Systems	3	OSP

Code	Course	Units	Track
PET 415	Petroleum Economics and Project Management	2	Core
PET 416	Industrial Training (SIWES)	3	Core
	Semester total	**23**	

Year 5: Specialisation, Integration and Professional Readiness

Semester 9 (First semester)

Code	Course	Units	Track
PET 501	Advanced Offshore Engineering	3	OSP
PET 502	Advanced Subsea Engineering	3	OSP
PET 503	Multiphase Flow in Pipelines	3	OSP
PET 504	Petroleum Reservoir Management	3	Core
PET 505	Oil and Gas Policy and Regulation	2	Core
PET 506	Health Safety and Environment in Petroleum Operations	2	Core
PET 507	Research Project II	3	Core
PET 508	Technical Elective I	2	Core
	Semester total	**21**	

Semester 10 (Second semester)

Code	Course	Units	Track
PET 509	Integrated Offshore Field Development	3	OSP
PET 510	Decommissioning and Abandonment	2	OSP
PET 511	Risk-Based Inspection and Asset Integrity	2	OSP
PET 512	Field Development Economics	2	Core
PET 513	Environmental Impact and Sustainability	2	Core
PET 514	Engineering Professional Practice and Ethics	2	Core
PET 515	Final-Year Design Project and Defence	4	Core
PET 516	Technical Elective II	2	Core
	Semester total	**19**	

Units by year

Year	Level	Units
Year 1	100	34
Year 2	200	42
Year 3	300	44
Year 4	400	46
Year 5	500	40
Total		206

5. Option Emphasis

Students choose the Offshore, Subsea and Pipeline option in Year 3, Semester 6. The option covers pipeline engineering and integrity, offshore engineering and structures, subsea systems and production, offshore drilling operations, marine risers and mooring, multiphase flow, flow assurance, risk-based inspection, decommissioning and integrated offshore field development. Core courses in geoscience, reservoir engineering,

drilling, production, economics and HSE are common to all students. Option courses are labelled OSP in the Track column.

6. Assessment Framework

The department uses a balanced assessment system. Exact weightings must be approved under the university's academic regulations and applicable programme standards.

Assessment method	Purpose
Written examinations	Test conceptual understanding and engineering analysis.
Assignments and problem sets	Assess calculations, design reasoning and independent learning.
Laboratory reports	Assess experimental method, data analysis and technical reporting.
Design projects	Assess engineering judgement, calculations, drawings and specifications.
Presentations and defences	Assess communication, teamwork and justification of technical decisions.
Industrial training	Assess workplace competence, professional conduct and practical experience.
Final-year project	Assess independent investigation and integrated engineering design.

7. Industrial Training and Projects

- **SIWES (Semester 8, 3 units):** supervised industrial attachment, assessed by logbook, report and assessor.
- **Research Project I and II (Semesters 7 and 9):** proposal, then execution and reporting.
- **Final-Year Design Project and Defence (Semester 10, 4 units):** integrated design with a formal defence.

8. Resource Requirements for Accreditation

The resource-verification file should document actual facilities, staff, maintenance and funding, not only proposed equipment.

- **Core analysis laboratory:** porosity, permeability and saturation measurement equipment.
- **Drilling fluids laboratory:** mud density, rheology and filtration testing.
- **Flow loop:** two-phase flow and pipeline demonstration facilities, where available.
- **Reservoir and well software:** licensed simulation, well-test and log analysis packages.
- **Industry links:** operators, subsea and pipeline contractors and offshore service companies for SIWES and visits.
- **Human resources:** qualified academic staff and technical staff with appropriate specialisms.
- **Library:** current textbooks, standards, technical journals and digital reference access.
- **Digital facilities:** software licences and computing infrastructure appropriate to the programme.
- **Industry partnerships:** employers, professional bodies and placement providers for SIWES.

9. Quality Assurance and CCMAS Alignment

- Map each course to the relevant NUC CCMAS course and learning outcomes.
- Verify course numbering, credit units, contact hours and prerequisites.
- Confirm the allocation of core and university-designed courses under the applicable CCMAS framework.
- Check professional requirements with COREN and other relevant accreditation bodies.
- Establish a curriculum review committee and an external academic review process.
- Submit the programme through the university's governance and regulatory approval processes.

10. Companion Documents

This curriculum is accompanied by the Students' Handbook, with full course specifications, and the Lecturers' Handbook, with teaching schemes, lab instructions, rubrics and assessment design.