NATIONAL BOARD FOR TECHNICAL EDUCATION

PROPOSED NATIONAL INNOVATION DIPLOMA

IN

PETROLEUM GEOSCIENCE

CURRICULUM AND COURSE SPECIFICATIONS

2007

PLOT B, BIDA ROAD, P.M.B. 2239 KADUNA-NIGERIA

TABLE OF CONTENTS

GENERAL INFORMATION

1.0 PROGRAMME NOMENCLATURE:

National INNOVATION Diploma in Petroleum Geoscience

2.0 GOALS AND OBJECTIVES:

The programme is designed to produce Diplomates who will be able to characterize the reservoir and understand the dynamics of flow Within the reservoir and know how to use all the geosciences software

On completion of this programme, the Diplomat should be able to:

1. Apply general safety rules and health management in oil & gas industry
2. Apply the knowledge of geophysics to data acquisition and analysis.
3. Use different Geosciences software applications necessary for handling sub-surface jobs.
4. Apply Petropyhsical knowledge relevant in formation evaluation
5. Understand the basic concept of reservoir geology and its overall relevance in reservoir modeling.
6. Provide alternate route to careers in the Professions relevant in the exploration and production of underground hydrocarbon resources.
7. Know how to apply real industry relevant skills in petroleum geosciences work.

3.0 SOFTWARE: Workbench, Roxar, Petrel, Eclipse, Geographix, HDS, M BAL, Pansystem, Enrin, Perform, Prosper, CMG IMEX and Monte Carlo etc.

4.0 ENTRY QUALIFICATION:

The general entry requirements include:

(i) Graduates (in relevant fields)
(ii) School Leavers (5 credits: including Maths/English)

5.0 DURATION:

(i) Graduates (in relevant fields) – 1 Year
(2) School leavers – 3 Years

6.0 CURRICULUM

The curriculum of the NID programme consists of four main components, these are:

(i) General Studies

(ii) Foundation Courses

(iii) Core Courses

(iv) Student Industrial Work Experience Scheme (SIWES)

6.1 General Studies:

English Language and Communication skill are these compulsory, and shall account for not more than 10% of total contact hours of the programme.

6.2 Foundation Courses:

Foundation courses include courses in Mathematic; Chemistry and Physic, etc. The number of hours may account for about 10% of the total contact hours.

6.3 Core Courses:

Core courses are courses which give the student the theoretical and practical skills needed to practice the profession. These accounts for 80% of the total contact hours.

6.4 Students Industrial Work Experience Scheme (SIWES):

SIWES shall be taken during the long vocation after the session has ended. See details of SIWES in paragraph 12.0

7.0 CURRICULUM STRUCTURE:

7.1 NID for Graduates:

The structure for this programme consists of three modules of classroom, laboratory and workshop activities in the institution and 3 months of industrial attachment. The industrial attachment period is developed into a single module. Each module is to last for 3 months

7.2 NID for School Leavers:

The structure of the NID programme for school leavers will consists of six semesters of classroom, laboratory, workshop and SIWES activities. 3-4 months period of SIWES will be carried out at the end of second and fourth semesters. Each semester shall be 17 weeks duration made up as follows: 15 contact weeks of teaching, i.e. recitation, practical exercises, quizzes, test etc; and 2 weeks for examinations and registration.

8.0 ACCREDITATION

The Programmes shall be accredited by the NBTE before diplomats can be awarded the Diploma. Details about the process of accrediting a programme for the award of the NID are available from the Executive Secretary, National Board for Technical Education (NBTE), plot 'B' Bida road, P.M.B. 2239, Kaduna Nigeria.

9.0 NATIONAL CERTIFICATION:

Institutions offering accredited programme will award the National INNOVATION Diploma to candidates who successfully completed the programme after passing prescribed course work, examinations and industrial module such candidates should have completed between 80 and 90% semester credit units of the programme.

10.0 EXAMINATION:

Examination for a particular course will commence immediately the course ends and examination will last for a period of 3-4 hours. The Examination will be set by the course consultant but administered by someone authorised by the Academic Board of the Institution.

The course consultant will provide the marking scheme for the examination which will be adhered to strictly by the person nominated to mark the scripts. Examination will also be conducted on the practical aspects of the courses.

11.0 TRAINING FORMATS:

A combination of learning formats will be used to maximize the learning process. They will include traditional classroom lectures, skill building through laboratory/shop assignments, simulation, e-learning, discussions, and visits to local operating facilities and, as appropriate, simulated job assignments.

12.0 GUIDELINES ON SIWES PROGRAMME

For the operation of SIWES the following guidelines shall apply:

(a) Institution offering the Diploma programme shall arrange to place the students in the industry.

(b) The placement officer should discuss and agree with industry on the following;

(i) By April, 30 of each year, six copies of master list showing where each student has been placed shall be submitted to the Executive Secretary, NBTE which shall, in turn, authenticate the list and forward it to Industrial Training Fund (ITF), Jos.

(ii) An approved task inventory of what the students should be expected to experience during the period of attachment.
(iii) The industry – based supervisor of the students during the period, likewise the institution based supervisor.
(iv) Final grading of student during the period of attachment should be weighted more on the evaluation by his/her industry-based supervisor.

12.1 Evaluation of Student during SIWES

In evaluation of the students, cognisance should be taken of the following items:

(a) Punctuality

(b) Attendance

(c) General attitude to work

(d) Respect for authority

(e) Interest in the field/technical area

(f) Technical competence.

12.2 The Institution Based Supervisor

The institution-based supervisor should make use of log book. This will enable him to check and determine to what extent the objectives of the scheme are being met and to assist students having any problems regarding specific assignments given to them by their industry-based supervisor.

12.3 Frequency of Visit

Institution should ensure the students on attachment are visited at least once a month.

12.4 Stipend for Students in SIWES

Federal Government after due consultation with Federal Ministry of Education, ITF and NBTE shall pay stipend to students at the end of the attachment.

12.5 SIWES as a Component of the Curriculum

The completion of SIWES is important in the final determination of whether the student is successful in the programme or not. Failure in the SIWES is an indication that the student has not shown sufficient interest in the field or has no potential to become a skilled technician.
The SIWES should be graded on a fail or pass basis. Where a student has satisfied all other requirement but failed, SIWES, he/she may only be allowed to repeat another four months SIWES at his/her own expense.

NATIONAL BOARD FOR TECHNICAL EDUCATION KADUNA

CURRICULUM TABLES

SCHOOL CERTIFICATE LEAVERS (ENTRY)

CURRICULUM TABLE FOR
NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE

FIRST YEAR, (SEMESTER ONE)

S/N	CODE	COURSE/MODULE TITLE	L	T	P	CU	CH
1	GNS 101	Use of English I	2	-	-	2	2
2	STC 121	Organic Chemistry I	2	-	3	3	5
3	STP 111	Mechanics	2	-	3	3	5
4	STP 112	Heat Energy	1	-	3	2	4
5	MTH211	Calculus	1	1	-	2	2
6	PPG 103	Presentation Skills	1	-	-	1	1
7	PPG 105	Water and Wastewater Analysis/Treatment	1	-	2	2	3
8	PPG 107	Health, Safety and Environment	1	-	2	2	3
9	PPG 109	Microsoft Office Application and Review	1	-	2	2	3
		TOTAL	12	1	15	19	28

FIRST YEAR, (SEMESTER TWO)

S/N	CODE	COURSE/MODULE TITLE	L	T	P	CU	CH
1	GNS 202	Communication Skills II	2	-	-	2	2
2	MTH201	Logic and linear Algebra	1	1	-	2	2
3	STA 111	Introduction to Statistics	1	1	-	2	2
4	SDV 201	Entrepreneurship Development	2	-	-	2	2
5	PPG 111	Introduction to Petroleum Industry	2	-	-	2	2
6	PPG 113	Crude oil, Natural Gas and Condensate Reserves	2	-	-	2	2
7	PPG 102	Basic Petroleum Geology	2	-	3	3	5
		TOTAL	12	2	3	15	17

SECOND YEAR, (SEMESTER ONE)

S/N	CODE	COURSE/MODULE TITLE	L	T	P	CU	CH
1	PPG 101	Technical Report Writing	1	-	-	1	1
2	PPG 115	Concepts of Geological (Static) Modelling	2	-	3	3	5
3	PPG 104	Reservoir Geology	1	-	2	2	3
4	PPG 106	Element of Seismic interpretation	1	-	2	2	3
5	PPG 108	Basic Well Log Interpretation	1	-	2	2	3
6	PPG 110	Fundamentals of Petrophysics	1	-	2	2	3
7	PPG 112	Coring and Core Analysis	1	-	2	2	3
		TOTAL	8	-	13	14	21

SECOND YEAR, (SEMESTER TWO)

S/N	CODE	COURSE/MODULE TITLE	L	T	P	CU	CH
1	PPG 114	Well Log and Core Data Integration	1	-	2	2	3
2	PPG 116	Concepts of Dynamic Modelling	2	-	3	3	5
3	PPG 201	HDS Software	-	-	4	2	3
4	PPG 203	Petrel Software	-	-	4	2	4
5	PPG 205	Geographix Software	-	-	4	2	4
6	PPG 207	Monte Carlo Software	-	-	4	2	4
7	PPG 209	Roxar Software	-	-	4	2	4
8	PPG 200	Field Project	-	-	6	3	6
		TOTAL	3	-	31	18	33

THIRD YEAR, (SEMESTER ONE)

S/N	CODE	COURSE/MODULE TITLE	L	T	P	CU	CH
1	PPG 211	Workbench Software	-	-	4	2	4
2	PPG 213	Prosper Software	-	-	4	2	4
3	PPG 215	Perform Software	-	-	4	2	4
4	PPG 217	MBAL Software	-	-	4	2	4
5	PPG 219	Pansystem Software	-	-	4	2	4
6	GIT 201	Elements of Geo- informatics	2	-	2	3	4
7	GIT 203	GIS Database Creation and Usage	2	-	2	3	4
		TOTAL	4	-	24	16	28

THIRD YEAR, (SEMESTER TWO)

S/N	CODE	COURSE/MODULE TITLE	L	T	P	CU	CH
1	PPG 221	Enrin Software	-	-	4	2	4
2	PPG 223	Eclipse Software	-	-	4	2	4
3	PPG 225	CMG Suite (IMEX and GEM) Software	-	-	4	2	4
4	PPG 200	Field Project	-	-	6	3	6
5	PPG 202	Industrial Module	-	-	6	3	6
6	PPG 204	Project	-	-	6	3	6
		TOTAL	-	-	30	15	28

GRADUATES (ENTRY)

CURRICULUM TABLE FOR
NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE

MODULE ONE (3 MONTHS)

S/N	CODE	COURSE/MODULE TITLE	L	T	P	CU	CH
1	PPG 101	Technical Report Writing	1	-	-	1	1
2	PPG 103	Presentation Skills	1	-	-	1	1
3	PPG 105	Water and Wastewater Analysis/Treatment	1	-	2	2	3
4	PPG 107	Health, Safety and Environment	1	-	2	2	3
5	PPG 109	Microsoft Office Application and Review	1	-	2	2	3
6	PPG 111	Introduction to Petroleum Industry	2	-	-	2	2
7	PPG 113	Crude oil, Natural Gas and Condensate Reserves	2	-	-	2	2
8	PPG 115	Concepts in Geological (Static) Modelling	2	-	3	3	5
		TOTAL	11	-	9	15	20

MODULE TWO (3 MONTHS)

S/N	CODE	COURSE/MODULE TITLE	L	T	P	CU	CH
1	PPG 102	Basic Petroleum Geology	2	-	3	3	5
2	PPG 104	Reservoir Geology	1	-	2	2	3
3	PPG 106	Element of Seismic Interpretation	1	-	2	2	3
4	PPG 108	Basic Well Log Interpretation	1	-	2	2	3
5	PPG 110	Fundamentals of Petrophysics	1	-	2	2	3
6	PPG 112	Coring and Core Analysis	1	-	2	2	3
7	PPG 114	Well Log and Core Data Integration	1	-	2	2	3
8	PPG 116	Concepts in Dynamic Modelling	2	-	3	3	5
		TOTAL	10	-	18	18	28

MODULE THREE(3 MONTHS)

S/N	CODE	COURSE/MODULE TITLE	L	T	P	CU	CH
1	PPG 201	HDS Software	-	-	4	2	4
2	PPG 203	Petrel Software	-	-	4	2	4
3	PPG 205	Geographix Software	-	-	4	2	4
4	PPG 207	Monte Carlo Software	-	-	4	2	4
5	PPG 209	Roxar Software	-	-	4	2	4
6	PPG 211	Work bench Software	-	-	4	2	4
7	PPG 213	Prosper Software	-	-	4	2	4
8	PPG 215	Perform Software	-	-	4	2	4
9	PPG 217	MBAL Software	-	-	4	2	4
		TOTAL	-	-	36	18	36

MODULE FOUR(3 MONTHS)

S/N	CODE	COURSE/MODULE TITLE	L	T	P	CU	CH
	PPG 219	Pansystem Software	-	-	4	2	4
	PPG 221	Enrin Software	-	-	4	2	4
	PPG 223	Eclipse Software	-	-	4	2	4
	PPG 225	CMG Suite (IMEX and GEM) Software	-	-	4	2	4
	PPG 202	Industrial Module	-	-	6	3	6
	PPG 204	Project	-	-	6	3	6
		TOTAL	-	-	28	14	26

ENGLISH COURSES

PROGRAMME: National INNOVATION Diploma (NID) in Petroleum Geoscience

COURSE: Use of English (Grammar)

SEMESTER 1: YEAR 1

CODE: GNS 101

DURATION: 30 Hours Lecture: 2 Tutorial: 0 Practical: 0

UNITS: 2

GOAL: The course is designed to enable student acquire skills necessary for writing good English.

GENERAL OBJECTIVES:

On completion of this course, the student should be able to:

1.0 Understand ways of promoting the necessary language skills which will enable student to cope effectively
2.0 Know how to write good essay.
3.0 Understand the basic rules of grammar.
4.0 Understand the essential qualities of paragraph**.**
5.0 Understand Literary Works in English.

PROGRAMME: NATIONAL DIPLOMA IN MECHATRONIC ENGINEERING TECHNOLOGY						
COURSE: Use of English I (Grammar)			**Course Code: GNS 101**		**Contact Hours: 2-0-0**	
General Objective 1.0: Understand ways of promoting the necessary language skills which will enable student to cope effectively.						
WEEK	**Course Specification: Theoretical Contents**			**Practical Content**		
	Specific Learning Outcome	**Teachers Activities**	**Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Resources**
1-3	1.1 Explain the necessity for acquiring good note-taking/making techniques. 1.2 List the methods of note-taking/making.' 1.3 Explain the use of dictionary. 1.4 Explain the use of the library. 1.5 Explain the type of information sources in the library. 1.6 Identify good reading habits. 1.7 Explain the different methods of reading viz, scan, skim, normal and study. 1.8 Use the different methods of reading explained in 1.7 above.	Ask the students: • The techniques of note taking/making and list the various methods. • The correct ways of using the dictionary. • The best ways of using the library. • To list the various information sources in the library and how to locate these information sources. • The different methods of reading and the difference between the methods.	Chalkboard, Duster, Recommended Textbooks.	-	-	-

	General Objective 2.0: Know how to write good essay.			**General Objective:**		
WEEK	**Specific Learning Outcome**	**Teachers Activities**	**Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Resources**
4-6	2.1 Explain the concept of language 2.2 List the characteristics of language. 2.3 Explain the four language skills, viz, speaking, listening, writing,	Ask the students: • The basic concept of language. • To mention the	Chalk and Blackboard	-	-	-

	readings. 2.4 Explain the functions of language. 2.5 List the uses of English Language in Nigeria, e.g. as the language of research, government, commerce etc.	characteristics of language. • To identify the functions of language. • To list the uses of English Language in Nigeria.				
	General Objective 3.0: Understand the basic rules of grammar.			**General Objective:**		
WEEK	**Specific Learning Outcome**	**Teachers Activities**	**Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Resources**
7-10	3.1 Explain grammar 3.2 Explain parts of speech 3.3 Analyse the use of parts of speech in sentences. 3.4 Correct common errors in the use of parts of speech in sentences. 3.5 Explain how to construct sentences with correct syntactic arrangement. 3.6 List punctuation marks. 3.7 Enumerate the uses of punctuation marks and how to punctuate a given passage. 3.8 Explain idioms, figures of speech and affrication.	Ask the students: • To explain grammar, parts of speech and how to apply them in a sentence. • To identify common errors in the use of parts of speech in sentences. • To construct sentences with correct syntactic arrangement. • To identify punctuation marks and their uses, and how to punctuate a given passage.	Chalk Chalkboard Duster.	-	-	-

		• To construct sentences to illustrate idioms, figure of speech and affixes.				
	General Objective 4.0: Understand the essential qualities of paragraph**.**			**General Objective**:		
WEEK	**Specific Learning Outcome**	**Teachers Activities**	**Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Resources**
11-13	4.1 Define a paragraph? 4.2 Name the parts of a paragraph viz: topic, sentence, development and conclusion/transition. 4.3 Explain the thematic qualities of a paragraph viz, unity, coherence and emphasis. 4.4 Explain methods of paragraph development viz, example, definition comparison and contrast etc. 4.5 Explain method of ordering details in a paragraph, viz, less complex to more complex and vice versa, less important to more important and vice versa, spatial, chronological etc. 4.6 Write specific paragraphs to illustrate 4.2 to 4. 5 above.	Ask the student: • To define a paragraph and to name the part of a paragraph. • Point out thematic qualities of a paragraph. • To explain the various methods of paragraph development and the methods of ordering details in a paragraph. • Give assingnments on writing and developing paragraphs	Chalk, chalkboard, Duster	-	-	-
	General Objective 5.0: Understand Literary Works in English.			**General Objective:**		

14-15	5.1 Define literature. 5.2 Explain the development of literature. 5.3 Differentiate between the literary genres. 5.4 Explain the functions of literature. 5.5 Explain the terminology of prose fiction, e.g. plot setting, characterization etc. 5.6 Explain an essay question on a given novel.	Ask the students: • The meaning of literature and the development of literature. • Give students examples of the literature functions. • Give assignments on plot setting and characterization • Answer questions based on a story from a given novel.	Chalk, chalkboard, Duster	-	-	-

Assessment: Course work 20%, Course tests 20%, Examination 60%

PROGRAMME: National INNOVATION Diploma (NID) in Petroleum Geoscience

COURSE: Communication Skill II

SEMESTER 2: YEAR 1

CODE: GNS 202

DURATION: 30 Hours Lecture: 2 Tutorial: 0 Practical: 0

UNITS: 2

GOAL: The course is designed to enable student acquire skills necessary for effective communication

GENERAL OBJECTIVES:

On completion of this course, the student should be able to:

1.0 Know the applications of registers.
2.0 Understand various types of correspondence.
3.0 Understand the concept of publications.
4.0 Know the production of good reports.

PROGRAMME: NATIONAL DIPLOMA IN MECHATRONIC ENGINEERING TECHNOLOGY						
COURSE: Communication Skill II			**Course Code:** GNS 202		**Contact Hours 2-0-0**	
General Objective: 1.0 Know the applications of registers.						
Week	**Course Specification: Theoretical Content**			**Practical Content**		
	Specific Learning Outcome	**Teachers Activities**	**Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Resources**
1 – 4	1.1 Explain the importance of registers. 1.2 Explain factors influencing register, viz; field (Profession), mode (speech or writing), tenor (relationship between the interacting parties). 1.3 List some items of register peculiar to different professions. 1.4 Identify items of register in a given passage. 1.5 State appropriate use of jargon.	• Teachers to emphasize on the items used and importance of registers to different professions.	Textbooks, Blackboard, Chalk, Publications, samples of correspondence, Registers and reports.	-	-	-

	General Objective 2.0: Understand various types of correspondence.			**General Objective: 2.0**		
Week	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Resources**
5-8	2.1 Describe different types of business letter e.g., applications, enquiries, invitations and complaint with their replies. 2.2 Demonstrate the use of suitable language for a specific type of letter. 2.3 Carry out an exercise on letter writing listed in 2.1 above.	• Give exercises to students on letter writing and corresponde nces. • Assess students work.	Textbooks, blackboard, publications, samples of correspondence and reports.	-	-	-
	General Objective 3.0: Understand the concept of publications.			**General Objective: 3.0**		
Week	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Resources**
9-12	3.1 Explain techniques of writing for publication. 3.2 Write essays on topical and current issues. 3.3 Analyse published essay of literacy value. 3.4 Evaluate the development of ideas in a given article. 3.5 Write good articles for publication.	• Teachers should involve the class in the analysis of published essays and texts.	Textbooks, blackboard, Chalk, Publications, samples of correspondence, registers and reports.	-	-	-

	General Objective 4.0: Know the production of good reports.			**General Objective: 4.0**		
Week	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Resources**
13-15	4.1 Define a report. 4.2 List the different types of report. 4.3 Enumerate uses of report. 4.4 List the characteristics of a good report. 4.5 Outline the stage of writing a report. 4.6 Evaluate a given report. 4.7 Write a report.	• Give examples of a good write up • Give assignments on report writing. • Assess students work.	Textbooks, blackboard, Chalk, Publications, samples of correspondence, registers and reports.	-	-	-

Assessment: Course work 20%, Course tests 20%, Examination 60%

MATHEMATICS COURSES

PROGRAMME: National INNOVATION Diploma (NID) in Petroleum Geoscience

COURSE: Calculus

SEMESTER 1: YEAR 1

CODE: MTH 211

DURATION: 30 Hours Lecture: 1 Tutorial: 1 Practical: 0

UNITS: 1

GOAL: The course is designed to enable student acquire skills necessary for applying basic principles of Calculus

GENERAL OBJECTIVES:

On completion of this course, the student should be able to:

1.0 Understand the basic concepts of differential Calculus and in application in solving engineering problems
2.0 Know integration as the reverse of differentiation and its application to engineering problems
3.0 Understand first order homogenous linear ordinary differential equations with constant coefficients as applied to simple engineering problems
4.0 Understand the basic concepts of partial differentiation and apply same to engineering problems

PROGRAMME: NATIONAL DIPLOMA IN MECHATRONIC ENGINEERING TECHNOLOGY						
COURSE: CALCULUS			**Course Code: MTH 211**		**Contact Hours 1-1-0**	
General Objective: 1.0 Understand the basic concepts of differential Calculus and in application in solving engineering problems						
Week	**Course Specification: Theoretical Content**			**Practical Content**		
	Specific Learning Outcome	**Teachers Activities**	**Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Resources**
1 – 4	1.1 Define limits with examples. 1.2 State and prove basic theorems on limits 1.3 Prove that lim sin θ/θ, lim Tan θ/θ = 1 as θ→0 1.4 Define differentiation as an incremental notation of a function. 1.5 Differentiate a function from first principles. 1.6 Prove the formulae for derivative of functions, function of a function, products, and quotient of functions. 1.7 Differentiate simple algebraic, trigonometric, logarithmic, exponential, hyperbolic parametric, inverse and implicit functions. 1.8 Derive second derivative of a function. 1.9 Apply differentiation to simple engineering and	• Teachers are to explain , give and solve simple engineering and technological problems	Chalkboard, textbooks, lecture notes, chalk, etc	-	-	-

	technological problems. 1.10 Explain the rate of change of a function. 1.11 Explain the condition for turning point of a function. 1.12 Distinguish between maximum and minimum value of a function. 1.13 Sketch the graph of a function showing its maximum and minimum points and points of reflexion. 1.14 Estimate error quantities from the small increment of a function. 1.15 Determine the tangent to a curve. 1.16 Determine the normal to a curve.					

	General Objective 2.0: Know integration as the reverse of differentiation and its application to engineering problems			**General Objective: 2.0**		
Week	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Resources**
5-8	2.1 Define integration as the reverse of differentiation. 2.2 Explain integration as a limit of summation of a function. 2.3 Distinguish between indefinite and definite integrals. 2.4 Determine the indefinite and definite integrals. 2.5 Determine the definite integral of a function. 2.6 Integrate algebraic, logarithmic, trigonometric and exponential simple functions. 2.7 List possible methods of integration. 2.8 Integrate algebraic and trigonometric functions by the substitution method. 2.9 Integrate trigonometric and exponential functions by parts. 2.10 Integrate algebraic functions by partial fraction.	• Ask students to apply integral calculus to simple function. • Explain in details with solved examples, the principle of integration.	Chalkboard, textbooks, lecture notes, chalk	-	-	-

	2.11 Integrate trigonometric and logarithmic functions applying reduction formula. 2.12 State standard forms of some basic integrals. 2.13 Calculate length of arc, area under a curve, area between two curves, volume of revolution, center of gravity, center of surface area, second moment and moment of inertia. 2.14 Define Trapezoidal and Simpson's rule as methods of approximating areas under given curves. 2.15 Find approximate area under a curve applying Trapezoidal method. 2.16 Find approximate area under a curve applying Simpson's rule. 2.17 Compare result obtained from Trapezoidal and Simpson's rules with the results by direct integration. 2.18 Apply integration to kinematics.					

	General Objective 3.0: Understand first order homogenous linear ordinary differential equations with constant coefficients as applied to simple engineering problems			**General Objective: 3.0**		
Week	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Resources**
9-12	3.1 Define first order differential equation 3.2 List order, degree, general solution, boundary or initial conditions and particular solution of differential equations. 3.3 List examples of various types of first order differential equations. 3.4 Define first order homogenous differential equations 3.5 List the methods of solving differential equations by separable variables. 3.6 Identify differential equations reducible to the homogenous form. 3.7 Explain exact differential equations. 3.8 Solve exact differential equations, e.g. (a) Show that $(3x^2 + y \cos x)$ $dx+(\sin x-4y^3)$ $dy = O$ is an exact differential	• Ask students to apply differential equation to solve engineering problems. • Explain in details with solved examples the application of differential equations to engineering problems.	Chalkboard, textbooks, lecture notes, chalk, etc.	-	-	-

	equation. (b) Find its general solution. 3.9 Define integrating factors. 3.10 Determine the solution of differential equations using integrating factors. 3.11 Define linear differential equations of the first order.					
	General Objective 4.0: Understand the basic concepts of partial differentiation and apply same to engineering problems			**General Objective: 4.0**		
Week	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Resources**
13-15	4.1 Define partial differentiation 4.2 Explain the uses of partial derivatives. 4.3 Solve problems on partial differentiation. e.g. f (x, y) = $x^2 + y^2 = 2xy$ find dy/dx, dx/dy 4.4 Apply partial differentiation to engineering problems.	• Solve problems on partial differential equations	Chalkboard, textbooks, lecture notes, chalk	-	-	-

Assessment: Course work 20%, Course tests 20%, Examination 60%

PROGRAMME: National INNOVATION Diploma (NID) in Petroleum Geoscience

COURSE: Logic and Linear Algebra

SEMESTER 2: YEAR 1

CODE: MTH 201

DURATION: 30 Hours Lecture: 1 Tutorial: 1 Practical: 0

UNITS: 1

GOAL: The course is designed to enable student acquire skills necessary for applying logic and linear algebra

GENERAL OBJECTIVES:

On completion of this course, the student should be able to:

1.0 Understand the basic rules of mathematical logic and their application to mathematical proofs.
2.0 Know permutation and combination
3.0 Know binomial theorem
4.0 Know matrices and determinants

PROGRAMME: NATIONAL DIPLOMA IN MECHATRONICS ENGINEERING TECHNOLOGY						
COURSE: LOGIC AND LINEAR ALGEBRA			**Course Code: MTH 201**			**Contact Hours 1-1-0**
General Objective: 1.0 Understand the basic rules of mathematical logic and their application to mathematical proofs.						
Week	**Course Specification: Theoretical Content**			**Practical Content**		
	Specific Learning Outcome	**Teachers Activities**	**Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Resources**
1-2 3-4	1.1 Define the essential of connectives, negation, conjunction, disjunction, implication and bi-implication 1.2 State the essential connectives defined in 1.1 above. 1.3 Explain grouping and parenthesis in logic, 1.4 Explain the importance of Truth Tables. 1.5 Define tautology 1.6 Give examples of types of tautology. e.g. i. If P and Q are distinct atomic sentences, which of the following are tautologies? (a) P - Q (b) PUQ - QUP (c) PV(P*Q) ii. Let P = Jane Austen was a contemporary of Beethoven. Q = Beethoven was a contemporary of Gauss.	• Explain and illustrate 1.1 to 1.6 and ask the students to find the truth value of the logic statement. • Assess the student. • Explain and illustrate 1.2 to 1.7 and asked the students to solve problems on 1.7 to 1.11.	Lecture notes, Recommended textbooks, charts, chalkboard	-	-	-

	R = Gauss was a contemporary of Napoleon S = 'Napoleon was a contemporary of Julius Caesar'. (Thus P, Q and R and true, and S is false). Then find the truth values of sentences:- (a) (P *Q) = R (b) (P - Q) (c) P *Q - R - S 1.7 Define universal quantifier and existential quantifier. 1.8 Translate sentences into symbolic form using quantifiers. e.g. 'some freshmen are intelligent' can be stated as for some x, x, is a freshman and x is intelligent' can translate in symbols as (/x) (Fx & Ix). 1.9 Define the scope of a Quantifier. 1.10 Define 'bound' and 'free' variables 1.11 Define 'term' and formula'. 1.12 Give simple examples of each of 1.9 to 1.11 above. 1.13 Explain the validity of formulae.					

	General Objective 2.0: Know permutation and combination			**General Objective: 2.0**		
Week	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**
5-7	2.1 Define permutations and combinations. 2.2 Give illustrative examples of each of 2.1 above 2.3 State and prove the fundamental principle of permutation. 2.4 Give illustrative examples of the fundamental principles of permutation. 2.5 Establish the formula $^nP_r = n!/ (n - r)!$ 2.6 Prove that $^nP_r = (n - r + 1) \times {}^nP_{r-1}$. 2.7 Solve problems of permutations with restrictions on some of the objects. 2.8 Solve problems of permutations in which the objects may be repeated. 2.9 Describe circular permutations. 2.10 Solve problems of permutation of N things not all different. 2.11 Establish the formula $^nC_r = n!/[(n - r)! r!]$ 2.12 Solve example 2.11 2.13 State and prove the	• Explain and illustrate the activities in 2.1 to 2.15 and ask the student to: establish the formula $^nP_r = n!/(n-r)!$ - Prove that $^nP_r = (n-r+1)(^nP_{r-1}$ - Establish the formula $^nC_r = n!/[n-r!]r!$ - Prove that $^nCr = nC_{n-r}$	Recommended textbooks, lecture notes, chalkboard, chalk, etc.	-	-	-

	theorem ${}^{n}C_{r} = {}^{n} C_{n-r}$. 2.14 Solve problems of combinations with restrictions on some of the objects. 2.15 Solve problems of combinations of n different things taken any number at a time.					
	General Objective 3.0: Know binomial theorem					
Week	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**
8-10	3. 1 Explain with illustrative examples - the method of mathematical induction. 3.2 State and prove binomial theorem for positive integral index. 3.3 Explain the properties of binomial expansion. 3.4 State at least seven (7) examples of 3.3 above. e.g. i. A $(x^2 - 1/x)$ ii. Find the constant term in the expansion of $(x + 1/x)^A$ iii. Find the co-efficient of xv in the expansion of $(x \pm k)^A$ where v is a number lying between -n and n-	• Explain and illustrate activities in 3.1 to 3.7 and ask the students to solve problems on them.	Recommended textbooks, lecture notes, chalkboard, chalk, etc	-	-	-

	3.5 State the binomial theorem for a rational number 3.6 State the properties of binomial coefficients. 3.7 Apply binomial expansion in approximations (simple examples only).					
	General Objective 4.0: Know matrices and determinants			**General Objective 4.0:**		
Week	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**
11-15	4.1 Define Matrix 4.2 Define the special matrices - zero matrix, identity Matrix, square matric, triangular matrix, symmetric matrix, skew symmetric matrix. 4.3 State example for each of the matrices in 4.2 above. 4.4 State the laws of addition and multiplication of matrices. 4.5 Illustrate the commutative, associative, and distributive nature of the laws stated in 4.4 above. 4.6 Explain the transpose of a matrix. 4.7 Determine a determinant for 2 x 2 and 3 x 3 matrices. 4.8 Define the minors and	• Explain and illustrate the activities in 4.1 to 4.19. • Ask the student to prove the theorems and solve problems on the illustrated activities. • Assess the student	Recommended textbooks, lecture notes, chalkboard, chalk, etc	-	-	-

	cofactors of a determinant. 4.9 Explain the method of evaluating determinants. 4.10 State and prove the theorem "Two rows or two columns of a matrix are identical, then the value of it's determinant is zero". 4.11 State and prove the theorem "If two rows or two columns of a matrix are interchanged, the sign of the value of its determinant is changed". 4.12 State and prove the theorem "If any one row or one column of a matrix is multiplied by a constant, the determinant itself is multiplied by the constant". 4.13 State and prove the theorem "If a constant times the elements of a row or a column is added to the corresponding elements of any other row or column, the value of the determinant itself is multiplied by the constant". 4.14 State five examples of					

	each of the theorems in 4. 10-4.13 above. 4.15 Define the adjoint of a matrix. 4.16 Explain the inverse of a matrix. 4.17 State the linear transformations on the rows and columns of a matrix. 4.18 Apply Crammer's rule in solving simultaneous linear equation. 4.19 Apply Linear transformation in solving simultaneous linear equations.					

Assessment: Course work 20%, Course tests 20%, Examination 60%

PROGRAMME: National INNOVATION Diploma (NID) in Petroleum Geoscience

COURSE: Introduction to Statistics

SEMESTER 2: YEAR 1

CODE: STA 111

DURATION: 30 Hours Lecture: 1 Tutorial: 1 Practical: 0

UNITS: 1

GOAL: The course is designed to enable student to understand basic concept of statistics

GENERAL OBJECTIVES:

On completion of this course, the student should be able to:

1.0 Understand statistics and all that it stands for
2.0 Understand the different methods of data collection and their limitations.
3.0 Know the different forms of data presentation
4.0 Understand the use and the importance of some measures of central tendency in summarizing data
5.0 Understand the use and importance of measures of dispersion in summarizing data
6.0 Know the different types of random variables
7.0 Understand the basic principles of probability
8.0 Understand some basic probability distributions and be label to identify each distribution
9.0 Understand the principles of correlation of two variables and the regression of one variable

PROGRAMME: NATIONAL DIPLOMA IN MECHATRONICS ENGINEERING TECHNOLOGY						
COURSE: Introduction to Statistics			**Course Code:** STA 111			**Contact Hours** 1-1-0
Course Specification: Theoretical Content				Practical Content		
Week	**General Objective: 1.0** Understand statistics and all that it stands for			**General Objective: 1.0**		
	Specific Learning Outcome	**Teachers Activities**	**Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Resources**
1-2	1.1 Define statistics 1.2 Explain with approximate illustrations, the use of statistics in Government, Biological Sciences, Physical Science. Business and Economics.	• State the importance of statistics in Government, Biological Sciences, physical Sciences, Business, Economics and etc.	Chalkboard, chalk, duster, calculators. Recommended text books	-	-	-

	General Objective 2.0: Understand the different methods of data collection and their limitations.			**General Objective: 2.0**		
Week	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**
5-7	2.1 State the method of collecting data 2.2 Describe the two main methods of collecting primary data: a) Established published sources b) "Ad-hoc" basic or experimentation 2.3 State the merits and demerits of the methods of collecting primary data 2.4 Explain the concept of data "editing" and its application in editing primary and secondary data. 2.5 Describe the sources of error in data collection	• Explain the methods of collecting data. • Give examples between the two methods as listed in 2.2 • Give the advantages and disadvantages of the two methods listed in 2.2. • Carry out exercises in data editing for primary and secondary data. • Give examples of the sources of error during data collection	Chalkboard, chalk, duster, calculators. Recommended text books	-	-	-

	General Objective 3.0: Know the different forms of data presentation					
Week	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**
8-10	3.1 Explain the objectives of classification of a mass of raw data 3.2 Prepare a frequency distribution form a given data 3.3 Explain the usefulness of diagrams in presenting statistical data 3.4 Construct bar chart, pie chart, histogram, frequency polygon and cumulative frequency polygon knave for a given set of data 3.5 Outline the merits and demerits of each diagram in 3.4 above.	• Give assignment on frequency distribution from a given data. • State the importance of diagrams in presenting statistical data. • Undertake all the different methods of data presentations as listed in 3.4 a s an assignments • Give examples of items in 3.4 • State the advantages and disadvantages of 3.4	Chalkboard, chalk, duster, calculators. Recommended text books	-	-	-

	General Objective 4.0: Understand the use and the importance of some measures of central tendency in summarizing data			**General Objective 4.0:**		
Week	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**
11-15	4.1 Define Arithmetic mean, Geometric Mean, Median, Mode and harmonic mean 4.2 Compute the measurer in 4.1 above given: i. ungrouped ii. grouped data 4.3 Explain the uses of Geometric and Germanic means 4.4 Calculate: Quantiles, Deciles , Percentiles given a set of data 4.5 List the merits and demerits of all the above measured of central tendency.	• Carry out class work on all the items in 4.1. • Solve problems as listed in 4.2 • Give lectures • Carry out class works on the parameters in 4.4 • Give the advantages and disadvantages of 4.5	Chalkboard, chalk, duster, calculators. Recommended text books	-	-	-

	General Objective 5.0: Understand the use and importance of measures of dispersion in summarizing data			**General Objective 5.0:**		
Week	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**
11-15	5.1 State the importance of measures of dispersion 5.2 Defined and calculate the mean deviation Semi interquartile range Variance and standard 5.3 Describe the application of the measures of dispersion defined in 5.2 above. 5.4 Calculate these standard error of the sample mean for given data	• Lecture • Undertake the calculation of standard error as class work for a given data	Chalkboard, chalk, duster, calculators. Recommended text books	-	-	-
	General Objective 6.0: Know the different types of random variables			**General Objective 6.0:**		
Week	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**
11-15	6.1 Define a random variable 6.2 Explain the concept of randomness 6.3 Define discrete and continuous variables	• Lecture and give students assignment	Chalkboard, chalk, duster, calculators. Recommended text books	-	-	-

	6.4 State examples of discrete and continuous variable					
	General Objective 7.0: Understand the basic principles of probability			**General Objective 7.0:**		
Week	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**
11-15	7.1 Define probability 7.2 Explain probability using the relative frequency approach 7.3 State the laws of probability 7.4 Solve simple problems by applying the laws of probability 7.5 Define conditional probability for two events.	• Carry out exercises generally on probability • Lecture and give students assignment	Chalkboard, chalk, duster, calculators. Recommended text books	-	-	-
	General Objective 8.0: Understand some basic probability distributions and be label to identify each distribution			**General Objective 8.0:**		
Week	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**
11-15	8.1 State the probability distribution of a random variable 8.2 Define mathematical expectation of discrete and continuous random variable 8.3 Define expectations of functions of discrete	• Lecture and give students assignment • Expansiate the two mathematic al expectation	Chalkboard, chalk, duster, calculators. Recommended text books	-	-	-

	random variable 8.4 Define the binomial distribution 8.5 Define conditional probability for two events 8.6 Calculate the means and variance under the Binomial and the poison distributions 8.7 Define Normal distribution 8.8 Approximate probabilities for given continuous random variables using normal distribution 8.9 Explain the characteristics of Binomial distribution 8.10 Apply Binomial distribution of samples with replacement 8.11 Solve given problems applying binomial distribution 8.12 Describe normal distribution curve and the empirical distribution rule 8.13 Explain the characteristics of Normal distribution	s as listed in 8.2 • Solve problems related to binomial and poison distribution • Explain the term Normal distribution • Carry out exercises on approximate probabilities • Carry out class work on problems in binomial distribution • Simulate probability questions				

	Calculate the probability given the deviation from the mean 8.14 Calculate the deviation given the means, standard deviation and a particular observation 8.15 Calculate the area under the curve at different point from either side of the mean. 8.16 Apply Normal distribution curve to simple Problems	• Carry out worked examples with students on parameters listed in 8.14 • Illustrate the application of 8.16 with worked examples.				
	General Objective 9.0: Understand the principles of correlation of two variables			**General Objective 9.0:**		

	and the regression of one variable on an.					
Week	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**	**Specific Learning Outcome:**	**Teachers Activities**	**Resources**
11-15	9.1 Define correlation 9.2 State the types of correlation 9.3 Describe the methods of studying correlation i. Scatter diagram (graphic method) ii. Kari Pearson's coefficient of correlation iii. Spearman's rank correlation 9.4 Calculate Pearson's and Spearman's correlation coefficients 9.5 Define regression equation of the form Y=a+bx using free-hand method and Method of least squares.	• Lecture and give students assignment • Work out problems with students on Pearson's and Spearman's	Chalkboard, chalk, duster, calculators. Recommended text books	-	-	-

Asse**ssment: Course work 20%, Course tests 20%, Examination 60%**

GEO-INFORMATICS COURSES

PROGRAMME: National INNOVATION Diploma (NID) in Petroleum Geoscience

COURSE: Elements of Geo-Informatics

SEMESTER 1: YEAR 3

CODE: GIT 201

DURATION: 60 Hours Lecture: 2 Tutorial: 1 Practical: 2

UNITS: 3

GOAL: The course is designed to enable student to understand basic elements of geo-informatics

GENERAL OBJECTIVES:

On completion of this course, the student should be able to:

1.0 Understand the general concept of Geo- Informatics.
2.0 Know the hardware and software requirements of Geo-Informatics.
3.0 Understand the various sources of data for Geo-Informatics.
4.0 Understand the methods of data acquisition for data base creation.
5.0 Understand the areas of application of Geo- Informatics.

PROGRAMME: NATIONAL DIPLOMA (ND) SURVEYING AND GEOINFORMATICS						
COURSE: Elements of Geo-Informatics			**COURSE CODE: GIT 201**		**CONTACT HOURS: 2-0-2**	
General Objective: 1.0 Understand the general concept of Geo- Informatics.						
	Course Specification: Theoretical Contents.			**Practical Content**		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1-2	1.1 Explain Geo-Informatics, map, digital mapping, databases etc. 1.2 Explain the basic concepts of Geo-Informatics. 1.3 Explain the basic principles of digital mapping. 1.4 Enumerate the accuracy of each type of data.	• Explain the basic l concept of Geo-Informatics	Chalkboard, chalk, duster, calculators. Recommended text books	• Familiarization with hardware and software. • Carryout exercises on map digitizing and scanning. • Demonstration of GIS software.	• Carryout exercises on map digitizing and scanning. • Demonstrate the use of GIS software	Chalkboard, chalk, duster, calculators. Recommended text books Maps Computers
	General Objective: 2.0 Know the hardware and software requirements of Geo-Informatics.			**General Objective**		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
3-5	2.1 State the various components of hardware for Geo-Informatics. 2.2 Explain the memory capacity required (such as RAM – 32 Mb or higher, harddisk of 1`.2 Gb or higher 2.3 Explain the speed of 200	• Explain the hardware and software requirement for Geo-Informatics	Chalkboard, chalk, duster, calculators. Recommended text books	-	-	-

	MHz of higher SVGA VRAM – IMB or greater, 24xCD drive, 3.5 drive of 1.44 Mb, etc.). 2.4 Mention the various Geo-Informatics software e.g. CAD Auto Cad, GIS Vector-MAP INFO, GIS-Raster, DIP, PC – Arc/Info (Windows based), Arc view (windows based) etc.					
	General Objective: 3.0 Understand the various sources of data for Geo-Informatics.			**General Objective**		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
6-7	3.1 State different types of map (e.g. topographic, thematic, digital, etc.). 3.2 List different types of images (e.g. aerial, satellite, radar, scanned aerial photos, etc.). 3.3 Explain the different types of observed data (e.g. from theodolite, PGS, Total station, levels, hydro-phones, geo-phones, statistical, etc.). 3.4 Enumerate historical	• Explain the various sources of data for Geo-Informatics • State the sources in 3.4	Chalkboard, chalk, duster, calculators. Recommended text books	-	-	-

	sources of data (e.g. cadastral, history, archeological, natural resources etc.)					
	General Objective: 4.0 Understand the methods of data acquisition for data base creation.			**General Objective**		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
8-11	4.1 List the various methods of data acquisition (e.g. aerial. Satellite, surveying, digitization, scanning, radar, statistical survey, etc.). 4.2 Explain the procedures of 4.1 above. 4.3 Outline the specification and limitations of 4.1 above for Geo-Informatics requirements. 4.4 Explain data conversion processes. 4.5 Enumerate the procedure of data base management.	• Describe the methods of data acquisition for Geo-Informatics • Lectures	Chalkboard, chalk, duster, calculators. Recommended text books	-	-	-

	General Objective: 5.0 Understand the areas of application of Geo-Informatics.			**General Objective**		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
12-15	5.1 State the various areas of application of Geo-Informatics (e.g. map revision, environmental monitoring and assessment, natural resources management, defense and security, utilities planning, engineering, population, forestry, agriculture, transport and aviation, petroleum resources, health, education, sports development, finance, archeology etc.). 5.2 Explain each of the above applications in 5.1 to national development. 5.3 Discuss the means of achieving the above applications in Nigeria. 5.4 Enumerate if any, the obstacles that could hinder the achievement of the application of Geo-Informatics in	• Explain the various areas of application of Geo-Informatics • Describe each of the above application to national developmen t • State the means achieving the above applications in Nigeria • Lectures	Chalkboard, chalk, duster, calculators. Recommended text books	-	-	-

	Nigeria. 5.5 Explain the role of Geo-Informatics experts in the society.					

Assessment: Coursework/ Assignments 10 %; Course test 20 %; Practical 30 %; Examination 40 %

PROGRAMME: National INNOVATION Diploma (NID) in Petroleum Geoscience

COURSE: GIS Database Creation and Usage

SEMESTER 1: YEAR 3

CODE: GIT 203

DURATION: 60 Hours Lecture: 2 Tutorial: 1 Practical: 2

UNITS: 3

GOAL: The course is designed to enable student to understand data base and usage

GENERAL OBJECTIVES:

On completion of this course, the student should be able to:

1.0 Understand database structures and data classification.
2.0 Understand the principles and procedures for data layer and creation of data files.
3.0 Understand the principles and procedures for data capture.
4.0 Understand the storage of spatial and non-spatial data.
5.0 Understand the basic operations on geographic database.

PROGRAMME: NATIONAL DIPLOMA (ND) SURVEYING AND GEOINFORMATICS						
COURSE: GIS Database Creation and Usage			**COURSE CODE: GIT 203**		**CONTACT HOURS:2-0-2**	
General Objective: 1.0 Understand database structures and data classification.						
	Course Specification: Theoretical Contents			**Practical Content**		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1-2	1.1 Define database (with examples) Database structures, database classification. 1.2 Explain the principles of database structures e.g. relational networking, object-oriented etc. 1.3 Enumerate the classes of database e.g. planimetric, altimetric, planimetric – altimetric, etc. 1.4 Explain the uses of database system.	• Explain the principles of database structures • State the classes of database • State the uses of database system	Chalkboard, chalk, duster, calculators. Recommended text books	• Carryout simple analysis of information derivable from the graphic displays. • Work out with students simple data base table. • Make Queries of the created table. • Design a simple data base using digital acquisition tools. • Ask students to do the same as above	• Create simple data base table • Create simple query of the created table • Carry out the design of a simple database.	Chalkboard, chalk, duster, calculators. Recommended text books Computers

	General Objective: 2.0 Understand the principles and procedures for data layer and creation of data files.			**General Objective**		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
3-5	2.1 Explain data layer and data files. 2.2 Explain types of data layers. 2.3 Explain types of data files. 2.4 Explain the principles of referencing common features. 2.5 Describe creation of data files. 2.6 Enumerate the procedures for linking data layer and data files. 2.7 Create data files for different layers.	• Explain the principles and procedures for data layer and creation of data files • List the procedures for linking data layer and data files • Lectures	Chalkboard, chalk, duster, calculators. Recommended text books	-	-	-
	General Objective: 3.0 Understand the principles and procedures for data capture.			**General Objective**		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
6-8	3.1 Explain the principles of data capture. 3.2 Explain the procedures for data capture using digital acquisition tools, tablets, scanners, digital photogrammetric work	• Explain the principles of data capture • Describe the procedures for data capture	Chalkboard, chalk, duster, calculators. Recommended text books	-	-	-

	station, analytical plotters, digital image processing system etc. 3.3 Capture data using the tools in 3.2 above. 3.4 Edit errors arising from data capture technique.	using various tools • Give assignments on data capturing using the tools in 3.2 • Ask students to identify errors from data capturing techniques				
	General Objective: 4.0 Understand the storage of spatial and non-spatial data.			**General Objective**		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
9-12	4.1 Describe spatial data and non-spatial data. 4.2 Explain the characteristics of spatial data. 4.3 Explain the characteristics (attributes) of Non-spatial data. 4.4 Carry out spatial data capturing using the tools in 3.2 above. 4.5 Carry out the correction	• Describe the storage of spatial and non-spatial data • Explain the differences between spatial and non-spatial data	Chalkboard, chalk, duster, calculators. Recommended text books	**-**	**-**	**-**

	for errors arising from the acquisition of 4.4 above. 4.6 Carry out the input of non-spatial data into tabular database. 4.7 Carry out correction for errors arising from inputting the non-spatial data in 4.6 above. 4.8 Carry out the linking spatial and non-spatial data of 4.5 and 4.7 above.	• Give out assignments on correcting errors for 4.6 • Give assignments on 4.6 and 4.7 • Work out link on spatial and non-spatial data				
	General Objective: 5.0 Understand the basic operations on geographic database.			**General Objective**		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
13-15	**Operations on Geographic Database** 5.1 Explain the basic operations on a geographic database. 5.2 Select various terrains features (one after the other) and display graphically. 5.3 Carryout simple analysis of graphic displays. 5.4 Set out for displays and	• Describe the basic operations of geographic database • Ask students to analyse graphic display	Chalkboard, chalk, duster, calculators. Recommended text books	**-**	**-**	**-**

	their associated attributes.	• Carry out displays with their associated attributes				

Assessment: Coursework/ Assignments 10 %; Course test 20 %; Practical 30 %; Examination 40 %

ENTREPRENEURSHIP COURSE

PROGRAMME: National INNOVATION Diploma (NID) in Petroleum Geoscience

COURSE: Entrepreneurship Development I

SEMESTER 2: YEAR 1

CODE: SDV 201

DURATION: 30 Hours Lecture: 2 Tutorial: 0 Practical: 0

UNITS: 2

GOAL: The course is designed to enable student to understand the basic concept of entrepreneurship

GENERAL OBJECTIVES:

On completion of this course, the student should be able to:

1.0 Understand the basic concept of Entrepreneurship
2.0 Understand the historical perspective of entrepreneurship development.
3.0 Know how to plan a business Entrepreneurship/Project.
4.0 Know how to operate simple stock keeping records.
5.0 Know how to prepare and operate cash flow on spreadsheets.
6.0 Understand employment issues.
7.0 Understand the Nigerian legal system
8.0 Comprehend the nature of contract and tort.
9.0 Understand Agency and Partnership

PROGRAMME: NATIONAL DIPLOMA IN MECHATRONIC ENGINEERING TECHNOLOGY						
COURSE: Entrepreneurship Development I			**Course Code: SDV 201**		**Contact Hours: 2-0-0 Hrs/Wk**	
General Objective 1.0: Understand the basic concept of Entrepreneurship.						
WEEK	**Course Specification: Theoretical Contents**			**Practical Content**		
	Specific Learning Outcome	**Teachers Activities**	**Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Resources**
1	1.1 Define the terms entrepreneurship, entrepreneur, small business and self-employment. 1.2 State entrepreneurship philosophy 1.3 Identify entrepreneurial characteristics. 1.4 Define development enterprise.	• Lecture and cite examples of each. • List entrepreneurial characteristics • Explain the development of enterprise	Chalk, Blackboard, Duster Recommended Textbooks Lecture Notes etc	-	-	-
	General Objective 2.0: Understand the historical perspective of entrepreneurship development.			**General Objective:**		
WEEK	**Specific Learning Outcome**	**Teachers Activities**	**Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Resources**
2	2.1 Enumerate the historical Perspective of enterpreneurship 2.2 Explain the origin of entrepreneurship. 2.3 Explain organizational structure. 2.4 Explain the role of an entrepreneur. 2.5 Explain the reasons for business failure.	• Explain the historical evolution of business enterprise citing example. • State the reasons for their failure/success.	Chalk and Blackboard, Duster Recommended Textbook Lecture Notes, etc.	-	-	-

	General Objective 3.0: Know how to plan a business Entrepreneurship/Project.			**General Objective:**		
WEEK	**Specific Learning Outcome**	**Teachers Activities**	**Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Resources**
3	3.1 Define the concepts: planning, business enterprise and project. 3.2 Explain the importance of planning to a business enterprise. 3.3 Analyse the skills and techniques of starting and managing small business successfully. 3.4 Prepare and present project proposal. 3.5 Undertake a small business enterprise for profit making	• Lecture and illustrate with examples. • Explain to the students the initial problems likely to be faced in starting business enterprise • Invite a successful entrepreneur to deliver lecture to the student. • Lecture and introduce the students to the formats of various project proposals.	Chalk and Blackboard, Duster Recommended Textbook Lecture Notes, etc.	-	-	-
	General Objective 4.0: Know how to operate simple stock keeping records.			**General Objective**:		
WEEK	**Specific Learning Outcome**	**Teachers Activities**	**Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Resources**
6	4.1 Carry out the ordering of spare parts/materials. 4.2 Undertake receipt of parts/materials. 4.3 Carry out the Storage of parts/materials. 4.4 Undertake the Issue of parts/materials.	• Lecture and demonstrate to students how to write receipt and keep records of ordering storage and issue of materials.	Store or any storage facility record note-book.	-	-	-

	General Objective 5.0: Know how to prepare and operate cash flow on spreadsheets.			**General Objective:**		
WEEK	**Specific Learning Outcome**	**Teachers Activities**	**Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Resources**
7	5.1 Explain the need for different records (capital, revenue, credit transaction, tax) 5..2 Describe formatting spreadsheet 5..3 Describe how to operate a spreadsheet	• Lecture and demonstrate for the students to appreciate. • Give practical exercise to students.	Chalkboard and Computer	-	-	-
	General Objective 6.0: Understand employment issues.			**General Objective:**		
WEEK	**Specific Learning Outcome**	**Teachers Activities**	**Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Resources**
8 - 9	6.1 Define the terms: education, training and development. 6.2 Relate education, training and development to employment. 6.3 Distinguish between skills and employment. 6.4 Explain the role of the private sector in employment generation. 6.5 Identify the forms and informal sectors. 6.6 Explain the issues of: (i) Rural Youth and Employment (ii) Urban Youth and Employment.	• Lecture and cite examples.	Chalkboard, Chalk, Duster, Recommended, Textbooks, Lecture Notes, etc.	-	-	-

	General Objective 7.0 Understand the Nigerian legal system			**General Objective:**		
WEEK	**Specific Learning Outcome**	**Teachers Activities**	**Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Resources**
10	7.1 Explain the nature of law. 7.2 Analyse the sources of Nigerian laws. 7.3 Evaluate the characteristics of Nigerian Legal System.	• Lecture	Chalkboard, Chalk, Duster, Recommended Textbooks, Lecture Notes, etc.	-	-	-
	General Objective 8.0 Comprehend the nature of contract and tort.			**General Objective:**		
WEEK	**Specific Learning Outcome**	**Teachers Activities**	**Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Resources**
11 - 12	8.1 Define contract. 8.2 Explain types of contracts. 8.3 State the basic requirements for a valid contract. 8.4 Analyse contractual terms. 8.5 Examine vitiating terms. 8.6 Explain breach of contract and remedies. 8.7 Define Tort. 8.8 Explain types of Tort. 8.9 Discuss tortuous liabilities and remedies.	• Lecture	Chalkboard, Chalk, Duster, Recommended Textbooks, Lecture Notes, etc.	-	-	-

	General Objective 9.0: Understand Agency and Partnership			**General Objective:**		
WEEK	**Specific Learning Outcome**	**Teachers Activities**	**Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Resources**
13-15	9.1 Define agency. 9.2 Explain creation of agency. 9.3 Explain authority of the agent. 9.4 Analyse the rights and duties of principal agent and third parties. 9.5 Explain termination of agency and remedies. 9.6 Define partnership. 9.7 Examine creation of partnership. 9.8 Explain relations of partners To one another and to Persons dealing with them 9.9 Analyse dissolution of partnership and remedies	• Lecture and cite examples	Chalkboard, Chalk, Duster, Recommended Textbooks, Lecture Notes, etc.	-	-	-

Assessment: Coursework 20%, Course Test 20%, Practical 0%, Examination 60%.

References: 1. Wole Adewunmi, "Business Management An Introduction", McMillan Nig. Ltd. Lagos. 1988.
2. Soji Olokoyo, "Small Business Management Guide Entrepreneurs", Ola Jamon Printers and Publishers, Kaduna.

PHYSICS COURSES

PROGRAMME: National INNOVATION Diploma (NID) in Petroleum Geoscience

COURSE: Mechanics

SEMESTER 1: YEAR 1

CODE: STP 111

DURATION: 75Hours Lecture: 2 Tutorial: 0 Practical: 3

UNITS: 3

GOAL: The course is designed to enable student to understand basic principles of mechanics

GENERAL OBJECTIVES:

On completion of this course, the student should be able to:

1.0 Understand rotational motion of rigid bodies
2.0 Understand the phenomenon of surface tension.
3.0 Understand periodic motion.
4.0 Understand the behavior of fluids in motion.

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE.						
COURSE: **Mechanics**			**COURSE CODE**: STP 111		**CONTACT HOURS**: 2-0-3	
GOAL: The course is designed to enable student to understand basic principles of mechanics						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0: Understand rotational motion of rigid bodies					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1-6	1.1 Explain the concept of the moment of inertia about an axis 1.2 State and Explain the expression for moment of inertia of the following: i) a rod ii) rectangular plate iii) ring iv) circular disc v) solid and hollow cylinders vi) a sphere 1.3 Explain radius of gyration 1.4 Calculate the radius of gyration for each of the bodies	• Solve numerical problems using the expressions stated in 1.2.	Lecture notes Rods, rectangular plate, ring, circular disc, solid cylinder, hollow cylinder, sphere.	• Determine experimentally the moment of inertia of a flywheel. • Determine the moment of inertia of a uniform rod using bifilar suspension.	Perform experiment to determine the moment of inertia of a flywheel. Perform an experiment to determine the moment of inertia of a uniform rod using bifilar suspension.	Flywheel of standard pattern with wall support. Mass attached to a length of cord. Vernier caliper Stop clock/watch Metre rule. Two heavy stands and clamps, two threaded

	1.5 Define Torque of a body about an axis. 1.6 Define angular momentum of a body about an axis. 1.7 Establish the relationship between torque τ and angular momentum (L) i.e. $t = \frac{dl}{dt}$ where t is time. 1.8 State the law of conservation of angular momentum. 1.9 Explain the reduction in speed of a rotating body when struck by a small mass applying the law of conservation of angular momentum. 1.10 Write and explain the expression for the kinetic energy of rotation of a rigid body. 1.11 Calculate moments of inertia about some axes of interest of the following, using the appropriate formulae	• Lecture and apply the expression in the calculation of kinetic energy and acceleration of rolling and sliding rigid bodies e.g. cylinder sphere, disc, ring etc. • Solve some numerical problems	Lecture notes Reference texts Inclined plane Cylinder, sphere, disc Ring, uniform rod rectangular plate.			corks, metre rule, brass rod, stop clock/watch.

	e.g. - Uniform rod - Ring - Circular disc - Solid cylinder - Hollow cylinder - Sphere - Rectangular plate.	and give assignment.				
	General Objective: 2.0: Understand the phenomenon of surface tension.					
7-9	2.1 Explain the phenomenon of surface tension 2.2 Explain the origin of surface tension using the molecular theory. 2.3 Define the coefficient of surface tension (stating its units). 2.4 Explain adhesive and cohesive forces. 2.5 Define angle of contact 2.6 Explain capillary action giving examples of everyday situation. 2.7 Explain the variation of surface tension with temperature. 2.8 Explain surface tension in terms of surface energy.	• Lecture • Use examples e.g. water and mercury etc to illustrate adhesive and cohesive forces. • Solve numerical problems and give assignment.	Water, mercury etc., Glass dish, chalk and board.	• Demonstrate the existence of surface tension • Determine experimentally the surface tension of a liquid by capillary rise method using	Use examples such as water from tap, floating of needle on surface of water etc to demonstrate the existence of surface tension. Explain the use of travelling microscope and torsion balance before allowing the students to carry out experiments on surface tension.	Needle Tissue paper Beaker Water Water Tap

	2.9 Relate surface tension to specific latent heat. 2.10 Calculate the surface tension of soap solution and soap bubble using the appropriate equations.			travelling microscope. • Determine experimentally the surface tension of a liquid using a torsion balance. • Demonstrate the variation of surface tension with temperature using Jaeger's method.	Students should determine experimentally the surface tension of a liquid by capillary rise method using travelling microscope. Demonstrate the variation of surface tension with temperature using Jaeger's method.	Lecture Note Laboratory travelling Microscope set of glass capillary, beaker dilute nitric acid caustic soda solution distilled- water stand with clamp Torsion balance. Beaker containing a

						liquid, large bottle filled with dropping funnel, on outlet tube bent twice at right angles/ To the end of the tube is forced a length of tubing which is immersed to given depth in the liquid. A manometer filled with xylol, a travelling microscope.

	General Objective: 3.0: Understand periodic motion.					
10-12	3.1 Explain the following:- (i) periodic motion (ii) simple Harmonic motion 3.2 List examples of systems performing simple Harmonic motion 3.3 Define the parameters Motion (amplitude; period T; Angular velocity w etc 3.4 State and explain the expression For the period of oscillation of The following:- i) a simple pendulum ii) compound pendulum iii) loaded elastic spring etc 3.5 Draw and explain the graphs of Potential Energy, Kinetic Energy And total Energy against distance From equilibrium position 3.6 Calculate velocities of bodies in Periodic and simple harmonic Motion when other parameters are known known.	• Lecture • Apply the formula for the period of oscillation in 3.4 to solve some simple numerical problems.	Visual Aids Computer Systems Text books White boards Markers	• Determine 'g' (acceleration due to gravity) experimentally using: i) compound pendulum ii)loaded spiral spring iii)loaded cantilever	Demonstrate and allow the students to carry out the practicals on how to determine 'g using compound pendulum, loaded spiral spring and loaded cantilever.	For 4.6 (i) Knitting needle, metre rule with holes drilled at equal interval Stop clock/watch. For 4.6 (ii) Spiral spring slotted weights stop clock/watch. Retort stand. For 4.6 (iii) Loaded metre rule, G-clamp stop clock/watch.

	General Objective: 4.0 Understand the behavior of fluids in motion.					
13-15	4.1 Explain viscosity applying molecular theory 4.2 Define velocity gradient in a fluid 4.3 Distinguish between streamline and turbulent flow. 4.4 State and explain Newton's formula for viscosity:- F = ƨ A x velocity gradient where F = frictional force in a liquid S = coefficient of viscosity A = the area of liquid surface 4.5 Define coefficient of viscosity S stating the units. 4.6 State the expression for the steady flow of liquid through a pipe i.e. Poiseulle's formula: Vol per sec = $\frac{\pi Pa^4}{8 \eta L}$ where Π = a constant (3.14) P = pressure difference A= radius of tube	• Lecture	Classroom Resources.	Determine experimentally the coefficient of viscosity of a low density liquid using porseuille's formula. Determine experimentally the terminal velocity of small ball bearings	Students should be allowed to determine experimentally the coefficient of viscosity of a low density liquid using porseuille's formula. Students should be made to perform the experiment to determine the	Measuring cylinder with marks for distance, stop clock/watch. Steel sphere of different diameters, micrometer screw gauge,

	L = length of tube ɳ = coefficient of viscosity 4.7 Describe and explain the motion of a small spherical body falling through a viscous fluid. 4.8 Explain terminal velocity 4.9 State and explain stoke's law – $F=6\Pi\eta a v$ where F is frictional force in liquid v. is terminal velocity; a = radius of spherical ball. 4.10 Write the expression for the terminal velocity of a small spherical ball i.e. falling through a liquid column: $V_o = \frac{2ga^2 P-6}{9\eta}$ where 6 is density of liquid P is the density of the bearing's material; a is radius of the bearing and g acceleration due to gravitation. 4.11 Explain the importance of viscosity in lubrication. 4.12 Explain the effect of temperature on the viscosity of a liquid. 4.13 Derive Bernoulli's equation. 4.14List some applications of Bernouli's principles e.g.			Demonstrate experimentally the variation of viscosity with temperature. Determine experimentally the value of the coefficient of viscosity of a liquid based on the	terminal velocity of small ball bearings . Students should be made to perform the experiment to investigate the variation of viscosity with temperature. Students should perform the experiment to determine the value of	etc.. Set of long tubes of different diameters, short inlet tubes, outer jackets for tubes, number of small steel ball bearings of different diameters, stop watch/clock. Set of long tubes of different diameters, short inlet tubes, outer jackets for tube and stir, thermometer, number of

	action of filter pumps and carburettors etc. 4..15 State the dimensions of coefficient of viscosity. 4.16 Calculate the terminal velocity of steel balls or other bodies falling under gravity in liquids.			equation. $V = \frac{\Pi Pa^4}{8\eta}$ where η is coefficient of viscosity, V is velocity, a is radius of the tube, t stands for time and P is Pressure difference. Use stoke's theorem to measure the viscosity of a liquid of high density.	coefficient of viscosity a liquid based on the equation. $V = \frac{\Pi Pa^4}{8\eta}$ where η is coefficient of viscosity, V is velocity, a is radius of the tube, t stands for time and P is Pressure difference. Student should perform an experiment to determine the viscosity of a high density liquid.	small still ball bearings of different diameters, vernier callipers, stop clock/watch. Cylindrical cylinder marked at different intervals, ball bearing, stop clock/watch, micrometer screw gauge.

Assessment: Coursework/ Assignments 10 %; Course test 20 %; Practical 30 %; Examination 40 %

PROGRAMME: National INNOVATION Diploma (NID) in Petroleum Geoscience

COURSE: Heat Energy

SEMESTER 1: YEAR 1

CODE: STP 112

DURATION: 75Hours Lecture: 2 Tutorial: 0 Practical: 3

UNITS: 3

GOAL: The course is designed to enable student understand basic principles of heat energy

GENERAL OBJECTIVES:

On completion of this course, the student should be able to:

1.0 Know how to construct and use different type thermometers
2.0 Understand different methods of determining specific heat capacity and apply Newton's cooling correction.
3.0 Understand the behavior of gases in terms of atomic and molecular motions
4.0 Understand the application of different modes of Heat transfer.

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE.						
COURSE: Heat Energy			**COURSE CODE**: STP 112		**CONTACT HOURS**: 2-0-3	
GOAL: The course is designed to enable student understand basic principles of heat energy						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0: Know how to construct and use different type thermometers**.**					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1-4	1.1 Define temperature using concept of thermal equilibrium. 1.2 Define temperature in terms of thermometric properties, length of liquid column, pressure of a gas under constant pressure, resistance of a wire, e.m.f. of thermocouple, radiation from a hot body. 1.3 Define temperature scale Celsius scale, Kelvin scale, ideal gas scale). 1.4 Convert Celsius to Kelvin scale.	• Lecture with examples	Classroom resources.	Identify the different types of thermometers:- Liquid in glass thermometers (choice of appropriate liquid). Resistance thermometer. Thermocouple Pyrometers Gas thermometer Clinical thermometers Minimum and maximum thermometers	Provide different types of thermometers and first allow students to identify them using their previous knowledge of thermometry.	Liquid in glass thermometers (choice of appropriate liquid). Resistance thermometer. Thermocouple Pyrometers Gas thermometer Clinical thermometers

	1.5 Compare the ideal gas scales and other scales. 1.6 List the basic fixed points on the international temperature scales. 1.7 Describe the appropriate uses of thermometers in 14.7 above.					Minimum and maximum thermometers
	General Objective: 2.0: Understand different methods of determining specific heat capacity and apply Newton's cooling correction.					
5-7	2.1 State Newton's laws of cooling dQ = Ks (Q-Qr) where Q is the body's temperature dt S is the area of the body's surface Or is temperature of its surrounding Q denotes heat lost from the body 2.2 Explain cooling corrections in measurements of quantity of heat.	• Lecture	Water, mercury etc., Glass dish, chalk and board.	Determine specific heat capacity of solid and liquid using electrical methods. Determine specific capacity of liquid by continuous flow method.	Students should determine specific heat capacity of solid and liquid using electrical methods. Student should determine specific capacity of liquid by continuous flow method.	- Calorimeter - Heater - Thermometer - Stop Clock/Watch -Ammeter -Voltmeter - Source of EMF Calendar and Barnes apparatus.

				Verify Newton's law of cooling experimentally	Students should verify Newton's law of cooling experimentally . Apply cooling corrections in heat experiment. Note: (i) Supervise the practicals. (ii) Group the students for the	Stop Clock/Watch. Source of EMF. -Ammeter -Voltmeter - Resistance Thermometer. Thermometer Stirrer made of copper wire. Stop watch/clock

					purpose of the practicals. (iii) Demonstrate the experiment for the students before allowing them to work in groups	Paraffin Beaker. Cooper calorimeter provided with a lit and supported on corks inside a double walled vessel containing cold water between the walls.

	General Objective: 3.0: Understand the behavior of gases in terms of atomic and molecular motions					
8-12	3.1 Define atom, molecule, Avogadro constant, relative molecular mass, mole, molar mass, molar volume and S.T.P 3.2 Differentiate between: (i) Number of moles; number of molecules and Avogadro's constant. (ii) Number of moles, mass of the gas and molar volume 3.3 State the assumptions of the kinetic theory of gases. 3.4 Explain Brownian motion 3.5 Explain Maxwellian distribution of velocities (quantitatively) 3.6 Explain the terms most probable speed, the mean speed and the mean square speed. 3.7 Derive the expression for the pressure exerted by an ideal gas. As $P=\frac{1}{3}\rho\bar{c}^2$ = density = mean square velocity 3.8 Relate the kinetic energy of a gas to its temperature. 3.9 Derive the equation of state of an ideal gas using the kinetic theory.	• Lecture	Classroom resources.	Demonstrate Brownian Motion. Verify the gas laws experimentally.	Demonstrate Brownian motion by asking the students to watch the movement of dust or smoke particles. Demonstrate the use of Boyles and Charles laws apparatus before asking students to verify the laws using the apparatus.	Boyles and Charles laws apparatus

	3.10 State Boyles and Charles laws. 3.11 Distinguish between real and ideal gas.					
	General Objective: 4.0 Understand the application of different modes of Heat transfer..					
13-15	4.1 Explain heat current. 4.2 Explain Thermal conductivity of a material. 4.3 State and explain Stefan's law of radiation. 4.4 Explain green house effect and its every day applications. 4.5 Explain black body radiation.	• Lecture	Classroom Resources.	Determine Thermal conductivity of copper using Searle's method. Determine Thermal conductivity of ebonite by Lees' Disc method.	The students should determine Thermal conductivity of copper using Searle's method. Supervise conduction of the practical. Students should determine Thermal conductivity of ebonite by Lees' Disc method. Supervise conduction of the practical.	Standard form of Searle's apparatus with steam heater. Beaker, stop clock/watch callipers. Standard laboratory form of Lees' Disc apparatus, stop clock/watch and screw gauge.

Assessment: Coursework/ Assignments 10 %; Course test 20 %; Practical 30 %; Examination 40 %

Recommended Textbooks & References:

(1) Advanced Level Physics by Nelkon and Parker
(2) Laboratory Manual of Physics by Tyler

CHEMISTRY COURSE

PROGRAMME: National INNOVATION Diploma (NID) in Petroleum Geoscience

COURSE: Organic Chemistry I

SEMESTER 1: YEAR 1

CODE: STC 121

DURATION: 75Hours Lecture: 2 Tutorial: 0 Practical: 3

UNITS: 3

GOAL: The course is designed to enable student understand the basic principles of organic chemistry

GENERAL OBJECTIVES:

On completion of this course, the student should be able to:

1.0 Understand the classification organic compounds
2.0 Understand Bonding Reactions and Application of Aliphatic Hydrocarbons
3.0 Know the chemical properties preparations and uses of monosubstituted aliphatic
4.0 Understand general methods of petroleum refining

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE.						
COURSE: Organic Chemistry I		**COURSE CODE**: STC 121		**CONTACT HOURS**: 2-0-3		
GOAL: The course is designed to enable student understand the basic principles of organic chemistry						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0: Understand the classification organic compounds					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1-5	1.1 List the major classification of organic compounds by functional groups. 1.2 Define homologous series as consisting of compounds with each successive member differing with – CH_2 – 1.3 State the members of a homologous series and their physical properties. 1.4 Define the functional group. 1.5 Identify functional groups in alkanols, alkanals, alkanones, amines, alkanoic, acids, phenols, nitriles	• Lectures • Lectures	Classroom resources	• Determine qualitatively the elements present in an organic compound. • Identify functional groups in organic compounds via qualitative chemical tests (reactions) • Analyse with students tables of characteristic stretching frequencies	Guide and supervise students	Chemicals test tubes

	ethers, esters, amides etc. 1.6 Draw structures for the functional groups in 1.5 above. 1.7 Understand that Infra Red spectroscopy is used to identify functional groups in an organic compound. To which end: 1.8 Explain the properties of light, including frequency, wavelength and energy 1.9 Discuss the electromagnetic spectrum 1.10 Discuss the energy associated with the IR region of the electromagnetic spectrum to molecular stretching, vibrations and rotation. 1.11 Enumerate the energy of absorption to the different functional groups.	• Lectures • Give the students tables of characteristic stretching frequencies. • Give assignments on the absorption rates of different functional groups				

	General Objective: 2.0: Understand Bonding Reactions and Application of Aliphatic Hydrocarbons					
6-10	2.1 Explain the existence of cis-trans isomerism in alkenes. 2.2 Draw cis-trans isomeric structures as in butene. 2.3 Use IUPAC nomenclature to name alkenes 2.4 Represent the addition reactions of simple alkenes by means of chemical equation e.g. with Br2 HBr and H2. 2.5 Describe the use of curly arrows to represent reaction mechanisms 2.6 Use curly arrows to show the mechanism of the above addition reactions of alkenes 2.7 Explain the use of alkenes in the production of polymers e.g. PVC, polyethene polystyrene etc 2.8 Explain that the	• Lectures • Make structural formulas of groups in 2.2	Classroom resources	• Use IR specroscopy to identify functional groups in unknown organic compounds and to identify organic compounds from a list of possibilities.	Teacher guides and supervises students in the laboratory	Glassware Chemicals (bromine or bromine water, cyclohexene, or similar Solvents

	carbon in alkynes is Sp hybridized. 2.9 Represent the addition reaction of alkynes by means of simple equation e.g. reaction with H2. Br2 and HBr.. 2.10 Describe chemical tests for the unsaturation in alkenes and alkynes. 2.11 Describe the industrial uses of alkynes e.g. production of oxyacetylene flame, production of vinyl chloride in the production of polymers.					

	General Objective: 3.0: Know the chemical properties preparations and uses of monosubstituted aliphatic					
11-13	3.1 State the functional group of alkanol as – OH 3.2 State the general formula of alkanols as ROH. 3.3 Apply the IUPAC system in naming monohydric alkanols. 3.4 Illustrate isomerism (including enantiomers) in monohydric alkanols. 3.5 Outline the methods of preparation of monohydric alkanols. 3.6 Describe the physical properties of alkanols 3.7 Describe each of the following reactions of monohydric alkanol: esterification; dehydration; oxidation; and alkoxide formation 3.8 Use curly arrows to show the mechanism of dehydration and reaction of an alcohol with an acyl chloride. 3.9 Specify the conditions for the reactions in 3.7 above. 3.10 Explain that alkanol could be mono or polyhydric. 3.11 Classify alkanols as 1^o, 2^o and 3^o alkanols. 3.12 State the general formular for the 1^o, 2^o and 3^o alkanols with examples 3.13 Differentiate between the product of	Lectures	Blackboard Chalk duster Blackboard Chalk duster	Either :Carry out the experimental dehydration of cyclohexanol (or similar) by using concentrated sulphuric acid and heat. Or: Carry out hydration of cyclohexene or similar by using dilute sulphuric acid Purify isopropanol by distillation (use a heating mantle) and identify the product by its boiling point	Supervise, guide students and explain reactions	Cyclohexanol, or alcohol, sulphuric acid, source of heating, Cyclohexanol, or alcohol, sulphuric acid, source of heating,

	oxidation of 1^{o}, 2^{o} and 3^{o} alkanols. 3.14 Describe the manufacture/industrial preparation of some common alkanols e.g methanol, ethanol. 3.15 Describe the industrial uses of alkanols. 3.16 Compare Haloalkanes to alkanes structurally. 3.17 Classify given haloalkanes as mono or polysubstituted. 3.18 Name haloalkanes IUPAC. 3.19 Outline methods of preparation of haloalkanes. 3.20 State the physical properties of haloalkanes. 3.21 Describe the reactions of haloalkanes with aqueous alkali, alcoholic KCN, alcoholic ammonia and magnesium metal. 3.22 Use curly arrows to show the mechanisms of the SN2 reaction between a haloalkane and hydroxide ion. 3.23 State equations for the reactions in 3.21 above. 3.24 List examples of the uses of haloalkanes in the synthesis of organometallics such as Grignard reagent and Reformatski reagent			Prepare n-octane from 1-bromooctane via the Grignard reaction. Purify the product (octane) by distillation (use a heating mantle) and identify the product by its boiling point		

	General Objective: 4.0 Understand general methods of petroleum refining					
14-15	4.1 Outline the origin of petroleum 4.2 State the types of crude oil in terms of specific gravity or nature of hydrocarbon present. 4.3 Outline the constituents of crude oil. 4.4 Describe following refining processes:- a) Separation processes: (i) Fractional distillation (ii) Vaccum distillation (iii) Solvent extraction (iv) Absorption b) b) Conversion processes: (i) hydrotreating (ii) catalytic refining (iii) catalytic cracking 4.5 List the products obtained from primary distillation of crude oil. Gas fraction, naphtha fraction, kerosene fraction, light gas, oil heavy gas oil residue.	• Lecture	Classroom Resources.	• Measure the specific gravity of a range of alkanes, alcohols, and oil products such as motor oil, diesel and petrol and relate results to structures.	Guide and supervise students and explain safety requirements and what is happening in the experiment	Catalyst (Al2O3, or broken unglazed porcelain or pumice or zeolite) higher alkanes (Vaseline etc) test tubes, rubber bungs, Bunsen burner

Assessment: Coursework/ Assignments 10 %; Practical 40% Examination 50%

Recommended Textbooks & References:

Organic Chemistry by McMurray. 6th edition. Thompson/Brooks-Cole.
Classic Chemistry Experiments published by The Royal Society of Chemistry (UK) and free on the internet at http://www.chemsoc.org/networks/learnnet/classic_exp.htm
Salters Advanced Chemistry Activities and Assessment Pack published by Heinemann
Chemistry by M.J. Sienko and R.A. Plane (Mc Graw Hill)
Chemistry (The Molecular Nature of Matter and Change) by M.S. Silberberg published by Mc Graw Hill
Small scale synthesis by M.Zanger and J.R.McKee published by Wm.C.Brown

PETROLEUM GEOSCIENCE COURSES

PROGRAMME: National INNOVATION Diploma (NID) in Petroleum Geoscience

COURSE: Technical Report Writing.

SEMESTER 1: YEAR 1:

CODE: PPG 101

DURATION: 15 Hours: Lecture: 1 Tutorial: 0 Practical: 0

UNITS: 1

GOAL: This course is designed to enable student acquire skills required for **w**riting good report.

GENERAL OBJECTIVES:

On completion of this course, the student should be able to:

1.0 Understand the language of report writing.
2.0 Know organization of report writing.
3.0 Understand problems of Technical report writing.
4.0 Know the general information of report writing.

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE.						
COURSE: Technical Report Writing			**COURSE CODE**: PPG 101		**CONTACT HOURS**: 1-0-0	
GOAL: The course is designed to enable student acquire the skill required for writing good report.						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0: Understand the language of report writing.					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1-4	1.1 Explain parts of speech. 1.2 Explain punctuation marks. 1.3 Explain how to construct clear and concise sentences. 1.4 Explain principles A, B and C of clear writing.	• Explain the language of report writing	Visual Aids Computer Systems Text books White boards Markers	-	-	-
	General Objective: 2.0: Know organization of report writing.					
5-9	2.1 Identify types of reports. 2.2 Explain the format for different reports. 2.3 Explain the procedure for writing reports. 2.4 Identify tables, figures and equations in a report.	• State the procedures for writing report	Visual Aids Computer Systems Text books White boards Markers	-	-	-

	General Objective: 3.0: Understand problems of technical report writing.					
10-12	3.1 Explain how to avoid poor organization of facts. 3.2 Explain how to avoid the use of unnecessary complex words. 3.3 Explain passive writing. 3.4 Explain impersonal writing.	• Describe how to avoid poor organization • Discuss passive and impersonal writing	Visual Aids Computer Systems Text books White boards Markers	-	-	-
	General Objective: 4.0 Know the general information of report writing.					
13-15	4.1 Describe words, styles, abbreviations and capitalization. 4.2 Explain the use of units and symbols.	• Explain styles, abbreviation , use of units and symbols during report writing	Visual Aids Computer Systems Text books White boards Markers	-	-	-

Assessment: Coursework/ Assignments 10 %; Test 30% Examination 60%

PROGRAMME: National INNOVATION Diploma (NID) in Petroleum Geoscience

COURSE: Presentation Skills.

SEMESTER 1: YEAR 1

CODE: PPG 103

DURATION: 15 Hours Lecture: 1 Tutorial: 0 Practical: 0

UNITS: 1

GOAL: The course is designed to enable participant acquire skills necessary for effective presentation.

GENERAL OBJECTIVES:

On completion of this course, the student should be able to:

1.0 Understand presentation format.
2.0 Understand how to organize the content of presentation.
3.0 Know the general contents of a presentation.

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM ENGINEERING.						
COURSE: Presentation Skills.			**COURSE CODE**: PPG 103		**CONTACT HOURS**: 1-0-0	
GOAL: The course is designed to enable participants require skill necessary for effective presentation.						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0: Understand presentation format.					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1-5	1.1 Explain the need of good preparation during presentation. 1.2 Outline the steps involved in presentation. 1.3 Discuss audience research and analysis. 1.5 Explain level of audience reaction patterns.	• Describe presentation format • Explain the steps involved in presentation	Visual Aids Computer Systems Text books White boards Markers	-	-	-
	General Objective: 2.0: Understand how to organize the content of presentation.					
6-10	2.1 Describe organization tools. 2.2 Outline the helpful hints about organization.	• Explain how to organize the content of presentation	Visual Aids Computer Systems Text books White boards Markers	-	-	-

	General Objective: 3.0 Know the general contents of a presentation.					
11-15	3.1 Describe standard presentation pattern. 3.2 State different types of conclusion. 3.3 Explain the psychological effects during presentation. 3.4 Describe how to deliver a good presentation. 3.5 Explain how to handle questions and answers during presentation.	• Explain the concept of standard presentation pattern	Visual Aids Computer Systems Text books White boards Markers	-	-	-

Assessment: Coursework/ Assignments 10 %; Test 30% Examination 60%

PROGRAMME: National INNOVATION Diploma (NID) in Petroleum Geoscience

COURSE: Water & Wastewater Analysis/Treatment.

SEMESTER 1: Year 1

CODE: PPG 105

DURATION: 45 Hours Lecture: 1 Tutorial: 0 Practical: 2

UNITS: 2

GOAL: The course is designed to enable students acquire skill necessary for industrial applications of water/wastewater.

GENERAL OBJECTIVES:

On completion of this course, the student should be able to:

1.0 Know critical contaminants of water, occurrence and their treatment.
2.0 Understand unit operations used in water treatment.
3.0 Know major water users and contaminant reducers.
4.0 Know Brine water Analysis.
5.0 Understand wastewater Treatment and Disposal.

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE						
COURSE: Water/Wastewater Treatment/Analysis.			**COURSE CODE**: PPG 105		**CONTACT HOURS**: 1-0-2	
GOAL: The course is designed to enable students acquire the skill required for industrial applications of water/wastewater.						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0: Know critical contaminants of water, occurrence and their treatment.					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1-3	1.1 List the primary contaminant of water. 1.2 List the secondary contaminants of water. 1.3 Illustrate using textual sources to look up contaminants recurrences. 1.4 Illustrate general forms of treatment for contaminants and their reduction.	• Mention critical contaminants of water	Visual Aids Computer Systems Text books White boards Markers	-	-	-
	General Objective: 2.0: Understand unit operations used in water treatment.					
4-7	2.1 Explain the processes of coagulation and flocculation for suspended solids too small to settle in a reasonable time. 2.2 Explain the process of solid and liquid separation used in primary sewage treatment.	• Describe the unit operations used in water treatment	Visual Aids Computer Systems Text books White boards Markers	• Demonstrate removal of hardness in water • Demonstrate formation and breaking of emulsions	Carry out removal of hardness in water Carry out formation and breaking of emulsions	Chemicals Kits Water Emulsions

	2.3 Explain the use of chemical precipitation to remove hardness and silica from problem waters. 2.4 Explain the formation and breaking of emulsions.					
	General Objective: 3.0: Know major water users and contaminant reducers.					
8-10	3.1 Describe the nature of water usage and treatment in drilling, production and refining of petroleum products. 3.2 Describe the nature of water usage and treatment in sour gas processing. 3.3 Describe how cooling water is treated and maintained. 3.4 Describe how boiler water quality is maintained.	• Mention major water users • Explain how cooling water is treated and maintained • Explain how boiler water quality is maintained	Visual Aids Computer Systems Text books White boards Markers	-	-	-
	General Objective: 4.0: Know Brine Water Analysis.					
11-13	4.1 Explain the determination of TDS by evaporation, by density, Conductivity charts and calculation. 4.2 Describe the process of determining the pH, hydroxide, carbonate and bicarbonate concentrations by acid	• Describe brine water analysis	Visual Aids Computer Systems Text books White boards Markers	• Determine TDS by evaporation, by density, Conductivity charts • Determine the pH, hydroxide, carbonate and bicarbonate concentrations by acid titration.	Carry out determination of TDS by evaporation, density, conductivity charts Carry out determination of pH, hydroxide, carbonate and bicarbonate	pH meter Chemicals Laboratory glass wares

	titration. 4.3 Describe the process of determining chloride, calcium and magnesium concentration by titration.			• Determine chloride, calcium and magnesium concentration by titration	Carry out determination of chloride, calcium and magnesium	
	General Objective: 5.0: Understand wastewater treatment and disposal.					
14-15	5.1 Describe how wastewater can be utilized to maintain oil field reservoir pressure. 5.2 Describe the problems associated with corrosion in a wastewater disposal system. 5.3 Explain the reasons for taking pressure readings from an injection well.	• Explain how wastewater can be utilized to maintain oil field • Explain the problems associated with corrosion in a wastewater disposal system	Visual Aids Computer Systems Text books White boards Markers	-	-	-

Assessment: Coursework/ Assignments 10 %; Practical 40% Examination 50%

PROGRAMME: National INNOVATION Diploma (NID) in Petroleum Geoscience

COURSE: Health, Safety and Environment.

SEMESTER 1: Year 1

CODE: PPG 107

DURATION: 45 Hours Lecture: 1 Tutorial: 0 Practical: 2

UNITS: 2

GOAL: This course is designed to provide the student with the knowledge of current rules and regulations as regards the health, safety of workers and environment.

GENERAL OBJECTIVES:

On completion of this course, the student should be able to:

1.0 Know the courses, effects and methods of prevention of accidents.
2.0 Know methods of fire prevention, fire fighting and fire control.
3.0 Know the use of personal protective equipment.
4.0 Know the hazards associated with oil and gas, noise and vibration.
5.0 Know the legislation relevant to health and sanitation the application of common laws to environmental safety.
6.0 Understand the importance of reports in accident prevention.
7.0 Know the methods of handling oil spillage.
8.0 Know the importance of good health and safety in working environment.
9.0 Understand basic methods of environmental impact assessment
10.0 Understand the common hazards of the Niger Delta environment
11.0 Understand the various responses to Health, Environment and social impact concerns

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE						
COURSE: Health, Safety and Environment.			**COURSE CODE**: PPG 107		**CONTACT HOURS**: 1-0-2	
GOAL: This course is aimed at exposing participants to current rules and regulations as regards the safety of the workers and environment.						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0: Know the courses, effects and methods of prevention of accidents.					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1	1.1 Define "accidents". 1.2 Explain the various accidents causative factors. 1.3 State the three groups affected by accidents and how each is affected. 1.4 Outline costs of accidents to:- (a) the government (b) the employee 1.5 State the part each of the groups named above can play in accidents prevention efforts.	• List out courses, effects and methods of accidents prevention	Visual Aids Computer Systems Text books White boards Markers	• Demonstrate financial implication on costs involving accidents	Carry out financial implication on costs involving accident	Visual Aids Computer Systems Text books White boards Markers

	General Objective: 2.0: Know methods of fire prevention, fire fighting and fire control.					
2-3	2.1 Define fire. 2.2 Describe the fire triangle and its application in fire fighting. 2.3 State classes of fire and the methods of extinction of each class. 2.4 List the various fire extinguishing agents the class (es) of fire each is used on. 2.5 Describe the fire main, fire pump, and hydrant. 2.6 Explain how to monitor fire protection systems. 2.7 Describe the sprinkler and deluge systems as applied to building and plant protection.	• List out the methods of fire prevention, fighting and control	Visual Aids Computer Systems Text books White boards Markers	• Demonstrate fire fighting and control	Carry out fire fighting and control	Fire extinguishers Fire pump Hydrant Sprinkler
	General Objective: 3.0: Know the use of personal protective equipment.					
4	3.1 List protective equipment for the ear, nose, head, the eye and face, upper limbs, and lower limbs. 3.2 List protective equipment against heat and radiation.	• Explain the use of personal protective equipment • Itemized all the equipment in 3.1 and 3.2	Visual Aids Computer Systems Text books White boards Markers	• Demonstrate the use of personal protective equipment	Carry out how to use personal protective equipment	Personal protective equipment

	General Objective: 4.0: Know the hazards associated with oil and gas, noise and vibration.					
5-6	4.1 Define flash point, ignition point, self-ignition point, explosion, and explosive limits. 4.2 Categorized substances based on their explosively range. 4.3 State the maximum permissible concentration in the atmosphere for vapours of common industrial substances. 4.4 Illustrate means of detecting noise problem, harmful effects of noise, the nature of noise, noise reduction and hearing protection.	• Point out hazards associated with oil and gas	Visual Aids Computer Systems Text books White boards Markers	• Determine the maximum permissible vapors concentration in the atmosphere	Carry out the determination of maximum permissible vapors concentration in the atmosphere	Visual Aids Computer Systems Text books White boards Markers
	General Objective: 5.0: Know the legislation relevant to health and sanitation the application of common law to environmental safety					
7	5.1 Outline the main provisions for ensuring health and safety at work. 5.2 Outline the main provisions of the factories acts as regards` fire precautions. 5.3 State the relevance of common law to health and safety at work. 5.4 Identify the general duties	• List out the legislation relevant to health and sanitation control	Visual Aids Computer Systems Text books White boards Markers	-	-	-

	and responsibilities of employers and others in the control of safety at work.					
	General Objective: 6.0: Understand the importance of reports in accident prevention.					
8-9	6.1 Explain the use of reports in accident prevention. 6.2 List main elements of oral and written reports and their purposes. 6.3 Explain the uses of statistical data e.g. accident incidence, frequency rate in planning prevention of accident.	• Explain the importance of reports in accidents prevention	Visual Aids Computer Systems Text books White boards Markers	• Apply statistics to the quantitive assessment of risk.	Carry out the application of statistics to the quantitive assessment of risk	Visual Aids Computer Systems Text books White boards Markers
	General Objective: 0.7: Know the methods of handling oil spillage.					
10	7.1 Explain the spillage of oil in Drilling industry. 7.2 Outline methods of handling oil spillage. 7.3 State the role of the environmental protection agency.	• State methods of handling oil spillage	Visual Aids Computer Systems Text books White boards Markers	• Demonstrate the various methods of handling oil spillage	Carry out how to handle oil spillage	Visual Aids Computer Systems Text books White boards Markers

	General Objective: 8.0: Know the importance of good health and safety in working environment.					
11-12	8.1 Explain: i) The need for accident prevention; ii) Psychological basis for accident prevention; iii) Economic basis of accident prevention. 8.2 Categorise potential causes of physical injuries and occupational illness in writing places. 8.3 Describe possible prevention measures for 8.2 above. 8.4 Identify personal safety considerations, working practices and hazard associated with processing industries.	• State the importance of good health and safety in work place	Visual Aids Computer Systems Text books White boards Markers	-	-	-

	General Objective: 9.0: Understand the basic methods of environmental impact assessment.					
13	9.1 Define Environmental Impact Assessment (EIA). 9.2 Explain the aim of EIA. 9.3 Explain the various Laws Concerning EIA. 9.4 Describe the processes involved in EIA 9.5 List the parties involved in EIA	• Explain the importance of EIA • Explain the advantages and disadvantages of EIA	Visual aids of past hazards caused by exploration Past EIA drafts and final reports Text books White boards Markers	• Carry out field trips to past impacted areas • Carry out the WinstonB Model for EIA Design • Carry out WinstonB post EIA/Project forecast	Organise a visit to past impacted areas Carry out the WinstonB Model for EIA Design Carry out WinstonB post EIA/Project forecast	- Tables Charts Field data
	General Objective: 10.0: Understand the common hazards of the Niger Delta Environment					
14	10.1 Describe the Geographical location of Niger Delta 10.2 Explain the polities of Niger Delta 10.3 Define the hazards Common to the Niger Delta environment 10.4 Explain the main Environmental problems Of the Niger Delta and What Government is Doing to solve the Problems.	• Explain why there is agitation in the Niger Delta region.	Visual clips of the Niger Delta terrain Maps Published articles.	• Carry out the use of Ibifubara RW and WB in solving the Niger Delta environment problems (e.g. participatory regional and local appraisal (PRLA))	Demonstrate the use of Ibifubara RW and WB in solving the Niger Delta environment problems	-

	General Objective: 11.0: Understand the Various Responses and Social Impact Concerns on Health and Environment.					
15	11.1 Define health impact and Mitigation 11.2 Define social impact and Mitigation 11.3 Explain the various Activities of government , companies and civil Societies to the environment	• Explain the response from government, companies, civil societies and general populace to environmental problems	Visual Aids Computer Systems Text books White boards Markers	-	-	-

Assessment: Coursework/ Assignments 10 %; Practical 40% Examination 50%

PROGRAMME: National INNOVATION Diploma (NID) in Petroleum Geoscience

COURSE: Microsoft Office Application and Review.

SEMESTER 1: Year 1

CODE: PPG 109

DURATION: 45 Hours Lecture: 1 Tutorial: 0 Practical: 2

UNITS: 2

GOAL: This course is designed to expose the student to computer appreciation

GENERAL OBJECTIVES:

On completion of this course, the student should be able to:

1.0 Understand basic computer skills necessary in the petroleum industry.
2.0 Know advanced techniques in using Microsoft packages.

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE		
COURSE: Microsoft Office Application and Review.	**COURSE CODE**: PPG 109	**CONTACT HOURS**: 1-0-2
GOAL: This course is designed to expose the student to computer appreciation		
COURSE SPECIFICATION: Theoretical Contents:	**Practical Contents**:	
General Objective: 1.0: Understand basic computer skills necessary in the petroleum industry		

WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1-2 3-4 5-8 9-11	1.1 Define Computer 1.2 List types of computer 1.3 Explain how to put a PC into use 1.4 Describe word processing concepts 1.5 Discuss word processing tools 1.6 Explain the Microsoft Word (theory) and application 1.7 Describe the tool bar, Menu bar etc 1.8 Describe how to edit using Microsoft word 1.9 Explain creation of document using word 1.10 Describe how to format a document 1.11 Describe document security	• Explain the importance and functions of computer • Explain the uses of tool bar, menu bar, file, format etc	Visual Aids Computer Systems Text books White boards Markers	• Demonstrate how to put PC into use • Demonstrate formatting using word	Put PC into use Carry out formatting using word	Visual Aids Computer Systems Text books White boards Markers

	General Objective: 2.0: Know advanced techniques in using Microsoft packages.					
12-13 14-15	2.1 Explain the concepts of Microsoft PowerPoint 2.2 Explain the concepts of Microsoft Excel 2.3 Explain the basic programming using Microsoft Excel 2.4 Illustrate the operation of database using Excel 2.5 Identify the use of Microsoft packages and their application 2.6 Describe the use of Microsoft packages in petroleum industry	• Explain the concept of Microsoft packages in 2.1-2.4	Visual Aids Computer Systems Text books White boards Markers	Demonstrate the use of Microsoft packages in 2.1-2.4	Carry out the applicacations of Microsoft packages in 2.1-2.4	Visual Aids Computer Systems Text books White boards Markers

Assessment: Coursework/ Assignments 10 %; Practical 40% Examination 50%

PROGRAMME: National INNOVATION Diploma in Petroleum Geoscience

COURSE: Introduction to the Petroleum Industry.

SEMESTER 1: Year 1

CODE: PPG 111

DURATION: 30 Hours Lecture: 2 Tutorial: 0 Practical: 0

UNITS: 2

GOAL: This course is designed to teach students a broad overview of the technology and activities in the petroleum industry.

GENERAL OBJECTIVES:

On completion of this course, students should be able to:

1.0 Understand Energy.
2.0 Understand the history and origin of petroleum industry in Nigeria.
3.0 Understand crude oil and some of its products.
4.0 Understand exploration, drilling and production of petroleum.
5.0 Know the procedure of petroleum processing.
6.0 Understand the transportation and distribution of petroleum products.
7.0 Understand the basic Economics and Profitability Analysis of the oil venture operation.

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE						
COURSE: Introduction to the Petroleum Industry.			**COURSE CODE**: PPG 111		**CONTACT HOURS**: 2-0-0	
GOAL: The course is designed to teach participants a broad overview of the technology and activities in the petroleum industry.						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0: Understand Energy					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1	1.1 Define Energy. 1.2 State the law of conservation of energy. 1.3 Describe the sources of world energy.	• Explain the concept of energy	Visual Aids Computer Systems Text books White boards Markers	-	-	-
	General Objective: 2.0: Understand the history and origin of petroleum industry in Nigeria.					
2-3	2.1 Describe the history and origin of petroleum in Nigeria. 2.2 Describe the exploration, drilling, and discovery division of the petroleum industry in Nigeria. 2.3 Describe the earth and its structure. 2.4 Explain the origin of oil and gas. 2.5 Explain earth movements, faults, folds, and unconformity. 2.6 Explain oil traps, stratigraphic structure	• Explain the history and origin of petroleum in Nigeria	Visual Aids Computer Systems Text books White boards Markers	-	-	-

	General Objective: 3.0: Understand crude oil and some of its products.					
4-5	3.1 Define crude oil. 3.2 Explain the physical and chemical properties of crude oil. 3.3 List products of crude oil processing.	• List out the properties of crude oil and its products	Visual Aids Computer Systems Text books White boards Markers	-	-	-
	General Objective: 4.0: Understand exploration, drilling and production of petroleum					
6-9	4.1 Describe aerial surveying method. 4.2 Explain the following:- i. geological exploration. ii. geophysical exploration. 4.3 Identify the equipment used in 4.2 above. 4.4 Explain the following:- i. drilling appraisal ii. drilling development iii. deviated drilling iv. directional drilling. v. horizontal drilling 4.5 Describe a drilling rig. 4.6 list out the drilling processes. 4.7 Describe off-shore and swamp drilling. 4.8 Describe casing, tubing, and single dual, multi lateral completion.	• Explain exploration, drilling and production of petroleum	Visual Aids Computer Systems Text books White boards Markers	-	-	-

	4.9 Explain the following well completion procedures: i. perforating ii. DST iii. packers iv. sand consolidations. 4.10 Describe the use of the following well-head equipment:- i. casing head flanges ii. tubing head iii. tubing hangers iv. adapter flanges v. Christmas trees. 4.11 Describe the following: i. oil and gas well ii. manifolds iii. flow lines iv. flow stations v. oil and gas discharge lines, terminals and pipeline. 4.12 Describe special forms of flowing wells. 4.13 Explain the term "Bringing-in" of a flowing well. 4.14 Describe production plot forms.					

	General Objective: 5.0: Know the procedure of petroleum processing.					
10-12	5.1 Define petroleum refining. 5.2 List out refinery products. 5.3 State roles of refineries in the petroleum industry. 5.4 Draw refinery overall block diagram. 5.5 Explain the following methods of preparing crude oil for primary processing: • Degassing • Desalting • Caustic washing • Heating • Preflashing. 5.6 Explain origin of petrochemicals from petroleum. 5.7 State essential chemicals from petroleum. 5.8 State the classes of raw materials from petroleum for the petrochemicals industry. 5.9 Describe schematic representation of "petrochemical trees".	• Explain petroleum processing techniques	Visual Aids Computer Systems Text books White boards Markers	-	-	-

	General Objective: 6.0: Understand the transportation and distribution of petroleum products.					
13-14	6.1 Explain the distribution/transportation of petroleum products, via – • Road • Rail • Water (Sea) • Pipelines 6.2 Explain the history of the pipelines – industries. 6.3 State different types of pipelines. 6.4 Describe scheduling and dispatching. 6.5 Explain a basic scheduling process with the aid of block diagram. 6.6 Explain, metering and proving systems and factors governing the accuracy. 6.7 Describe types of motors with particular reference to the following: • Venturing • Orifice • Positive Displacement (PD) meters. • Flow Straightness. • Totalizers.	• Explain the methods of transporting and distributing petroleum products	Visual Aids Computer Systems Text books White boards Markers	-	-	-

	General Objective: 7.0: Understand the basic Economics and Profitability Analysis of the oil venture operation.					
15	7.1 Describe factors which influence the economics of petroleum business operations. 7.2 Explain the terms: Capital, Items, Expense, I Payback, Depreciation and profit. 7.3 Calculate present and future values as they apply to petroleum business decisions.	• Explain basic economics and profitability analysis of petroleum venture	Visual Aids Computer Systems Text books White boards Markers			

Assessment: Coursework/ Assignments 10 %; Test 30% Examination 60%

PROGRAMME: National INNOVATION Diploma in Petroleum Geoscience

COURSE: Crude Oil, Natural gas and Condensation Reserves.

SEMESTER 1: **YEAR**: 1

CODE: PPG 113

DURATION: 30 Hours Lecture: 2 Tutorial: 0 Practical: 0

UNITS: 2

GOAL: This course is designed to equip students with different methods for reserve estimation and uncertainties.

GENERAL OBJECTIVES:

On completion of this course, students should be able to:

1.0 Know oil and gas reserves.
2.0 Know Estimation of oil and gas reserves.

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE.						
COURSE: Crude oil, Natural gas and condensate Reserves.			**COURSE CODE**: PPG 113		**CONTACT HOURS**: 1-0-0	
GOAL: The course is designed to equip students with different methods for reserve estimation ands uncertainties.						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0: Know oil and gas reserves.					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1-2 3-5 6-9	1.1 Define reservoir fluids. 1.2 List examples of reservoir fluid. 1.3 Explain the following:- • Fluid distribution • Fluid Contacts 1.4 Define the term. condensates 1.5 Classify reservoir fluids e.g. water, oil and gas. 1.6 Measure the various characteristics of reservoir fluid e.g. composition, chemical and properties etc.	• Describe oil and gas reserves	Visual Aids Computer Systems Text books White boards Markers	• Demonstrate how to measure the various characteristics of reservoir fluid	Carry out determination of various characteristics of reservoir fluid	Reservoir fluid

	General Objective: 2.0: Know estimation of oil and gas reserves.					
10-12 13-15	2.1 Classify reserves. 2.2 Describe the following reserve estimation method: • Analogy • Volumetric • Material Balance • Performance/Decline • Trend Analysis • Probabilistic Estimation. 2.3 Mention problems associated with reserve estimation.	• Explain estimation of oil and gas reserves	Visual Aids Computer Systems Text books White boards Markers	• Estimate oil and gas reserves	Carry out the estimation of petroleum reserves	Data Calculators

Assessment: Coursework/ Assignments 10 %; Test 40% Examination 60%

PROGRAMME: National INNOVATION Diploma in Petroleum Geoscience

COURSE: Concepts in Geological (Static) Modelling

SEMESTER 1: Year 1

CODE: PPG 115

DURATION: 75 Hours Lecture: 2 Tutorial: 0 Practical: 3

UNITS: 3

GOAL: This course, the participant will be shown how to use current industry software in building static model.

GENERAL OBJECTIVES:

On completion of this course, students should be able to:

1.0 Know Geological Concepts in Building a Reservoir Model
2.0 Know how to Select Well Location
3.0 Know how to Construct Geological Maps

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE						
COURSE: Concept in Geological (Static) Modelling			**COURSE CODE**: PPG 115		**CONTACT HOURS**: 2-0-3	
GOAL: In this course the participant will be shown how to use current industry software in building a static model						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0: Know geological concepts in building a reservoir model					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1-2 3-5 6-7	1.1 Describe sequence stratigraphic concepts to clastic reservoirs 1.2 Explain reservoir size, shape, trend and quality 1.3 Explain 3D Petrophysical property modelling 1.4 Explain Advanced volume calculations 1.5 List out Upscaling processes 1.6 Describe Simulation grid export and import, including post processing in 4D with time step player 1.7 Explain the effects of deformation on reservoir porosity, permeability, and continuity	• Describe geological concepts in building a reservoir model	Visual Aids Computer Systems Text books White boards Markers	• Demonstrate stratigrahy of clastic reservoir rocks • Demonstrate upscaling	Prepare stratigraphic column of clastic reservoir rocks Carry out software upscaling	Sandstones Software

	General Objective: 2.0: Know how to select well locations					
8-9 10-11 12-13	2.1 Distinguish the characteristics of each structural style on reflection seismic sections 2.2 Illustrate the mechanics of deformation for each structural style 2.3 Identify stratigraphic sequences 2.4 Analyse seismic reflection geometries 2.5 Compare sequence stratigraphy to basin architecture, relative sea levels and history 2.6 Describe predictive stratigraphic models 2.7 Analyse clastic depositional environments using data from cores, cuttings and wireline logs (including FMI)	• Explain how to select well locations	Visual Aids Computer Systems Text books White boards Markers	• Interpret the mechanics of deformation for various structural style	Carry out the interpretation of deformation for structural style	Software

	General Objective: 3.0: Know how to construct geological maps					
14-15	3.1 Prepare quantitative facies maps 3.2 Apply mechanical-stratigraphic concepts to understand and predict trap geometry 3.3 Use restoration and balance to validate and interpret the structural evolution 3.4 Identify the structural style or styles of a region from map and cross-sectional expression	• Describe how to construct geological maps	Visual Aids Computer Systems Text books White boards Markers	• construct geological maps	Carry out the construction of geological maps	Samples of geological maps, geological data

Assessment: Coursework/ Assignments 10 %; Practical 40% Examination 50%

PROGRAMME: National INNOVATION Diploma in Petroleum Geoscience

COURSE: Basic Petroleum Geology

SEMESTER 2: Year 1

CODE: PPG 102

DURATION: 75 Hours Lecture: 2 Tutorial: 0 Practical: 3

UNITS: 3

GOAL: The course is designed to give the student indepth knowledge of the principles of petroleum geology

GENERAL OBJECTIVES:

On completion of this course, students should be able to:

1.0 Understand generation, migration and accumulation of petroleum
2.0 Understand well-site geology principles and practice
3.0 Know well-logging
4.0 Understand the key elements in sedimentary basins

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE						
COURSE: Basic Petroleum Geology			**COURSE CODE**: PPG 102		**CONTACT HOURS**: 2-0-3	
GOAL: The course is designed to give the student indepth knowledge of the principles of petroleum geology						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0: Understand generation, migration and accumulation of petroleum					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1-4	1.1 Explain the general concept of petroleum migration 1.2 Describe the geological framework of petroleum migration based on: short or long migration, primary migration water squeezed out of clays, normal water circulation, and secondary migration. 1.3 Explain petroleum accumulation based on: tilted oil water contacts, and stratigraphic barriers vertical migration time accummulation.	• Explain the concepts of petroleum migration and accummulation	Visual Aids Computer Systems Text books White boards Markers	-	-	-

	General Objective: 2.0: Understand well-site geology principles and practice					
5-10	2.1 Describe mud logging principles based on drill rate and pump stroke counters 2.2 Describe principles of depth correction of the mud and cuttings (lag) 2.3 Perform calculations to relate cuttings and gas to formation depths 2.4 Determine gas from drill mud, and oil from drill mud and cuttings 2.5 Describe lithological logs and lithology principles 2.6 Explain the significance of mud level and individual pits, gain or loss in mud volume, and shale factor 2.7 Explain the	• Discuss the principles of well-site geology with students	Visual Aids Computer Systems Text books White boards Markers	• Demonstrate mud hogging principles based on drill rate and pump stroke counters determination • Demonstrate depth correction of the mud and cuttings experiments with students • Demonstrate wire-line tests and logs Experiments • Carry out determination of gas from drill mud, oil from drill mud and cuttings	Carry out the experiment with the students	Laboratory

	significance of : shale density, bits record, mud density record, mud viscosity and salt content of mud 2.8 Explain wire-line tests and logs 2.9 Explain well-correlation and side quall samples					
	General Objective: 3.0: Know well-logging					
11-13	3.1 Explain the preparation of lithological composite log from driller's log, drill time and mud analysis 3.2Describe the use of electric logs as tools for lithofacies studies 3.3Explain the estimation of hydrocarbons using combinations of electrical and GRN logs as tools for structural interpretation of the geology of the well	• Show how to prepare lithological log with students • Describe the use of electric logs as tools for lithofacies studies • Describe the estimation of hydrocarbon using the combinations of electrical and GRN logs	Visual Aids Computer Systems Text books White boards Markers	• Carry out the preparation of lithological composite log from driller's log, drill time log and mud analysis • Carry out the estimation of hydrocarbons using the combinations of electrical and GRN logs	Demonstrate the preparation of lithological log from driller's log. Demonstrate the determination of drill time log and mud analysis Carry out estimation of hydrocarbons experiments	Laboratory

	General Objective: 4.0: **Understand the key elements in sedimentary basins**					
14-15	4.1Define sedimentary rocks. 4.2Explain the characteristics of sedimentary basin. 4.3 Explain the following: trap, cap rock, source rock and reservoir rock	• Explain the key elements in sedimentary basins	Visual Aids Computer Systems Text books White boards Markers Diagrams	-	-	-

Assessment: Coursework/ Assignments 10 %; Practical 40% Examination 50%

PROGRAMME: National INNOVATION Diploma in Petroleum Geoscience

COURSE: Reservoir Geology

SEMESTER 2: Year 1

CODE: PPG 104

DURATION: 45 Hours Lecture: 1 Tutorial: 0 Practical: 2

UNITS: 2

GOAL: The course is designed to give the student indepth understanding of the basic concept of reservoir geology

GENERAL OBJECTIVES:

On completion of this course, students should be able to:

1.0 Understand the properties of reservoir rocks.

2.0 Understand trapping mechanisms

3.0 Know reservoir estimation

4.0 Understand sequence of stratigraphy

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE						
COURSE: Reservoir Geology			**COURSE CODE**: PPG 104		**CONTACT HOURS**: 1-0-2	
GOAL: The course is designed to give the student indepth understanding of the basic concept of reservoir geology						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0: Understand the properties of reservoir rocks					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1-4	1.1 Explain the objectives of Reservoir rock study. 1.2 List out the properties of reservoir rocks. 1.3 Identify and characterize reservoir rocks.	• Explain the importance of studying reservoir rocks. • Explain the structure, nature and composition of reservoir rocks • List out the characteristics of clastic rocks, carbonate rocks	Visual Aids Computer Systems Text books White boards Markers Reservoir rock samples	• Identify reservoir rocks • Characterize reservoir rocks	Carry out identification of reservoir rocks	Reservoir rock samples: sandstone samples, clastic samples, carbonate samples.

	General Objective: 2.0: Understand trapping mechanisms					
5-6	2.1 Explain trapping Mechanisms 2.2 Define: source rocks, reservoir rocks, seal , trap, timing, maturation, migration	• Draw structural trap diagram to explain trapping mechanisms	Visual Aids Computer Systems Text books White boards Markers Diagram samples	-	-	-
	General Objective: 3.0: Know reservoir estimation					
7-10	3.1 Explain reservoir hydrostatics 3.2 Evaluate reservoir estimation using Recovery techniques (Geological consideration)	• List out recovery techniques	Visual Aids Computer Systems Text books White boards Markers Relevant softwares	-	-	-
	General Objective: 4.0: Understand sequence of stratigraphy					
11-15	4.1 List out seismic Techniques	• Briefly describe seismic method. • Prepare seismic stratigraphic model	Model samples. Seismic data, Computer set, softwares Visual Aids White boards Markers	• Prepare Seismic stratigraphical Column	Carry out seismic stratigraphy	Software

Assessment: Coursework/ Assignments 10 %; Practical 40% Examination 50%

PROGRAMME: National INNOVATION Diploma in Petroleum Geoscience

COURSE: Element of Seismic Interpretation

SEMESTER 2: Year 1

CODE: PPG 106

DURATION: 45 Hours Lecture: 1 Tutorial: 0 Practical: 2

UNITS: 2

GOAL: The course is designed to give the student indepth understanding of seismic interpretation

GENERAL OBJECTIVES:

On completion of this course, students should be able to:

1.0 Understand seismic survey data acquisition process

2.0 Know how to process and interprete seismic sections.

3.0 Know the concept of seismic stratigraphy

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE						
COURSE: Elements of seismic interpretation			**COURSE CODE**: PPG 106		**CONTACT HOURS**: 1-0-2	
GOAL: The course is designed to give the student indepth understanding of seismic interpretation						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0: Understand seismic survey data acquisition process					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1-3 4-7 8-10	1.1 Define Seismic survey method. 1.2 List the two types of Seismic survey methods. 1.3 List out the processes involved in carrying out seismic operations. 1.4 State the peculiarities of each of the methods in 1.2 above. 1.5 Explain Seismic velocity variations 1.6 Define Acoustic impedance. 1.7 Itemize the equipments used for Seismic surrey. 1.8 Explain the problems affecting seismic survey method.	• Explain seismic reflection and refraction • Explain waves velocity variations in layers	Computer setting, Seismograph, Explosives, Geophones, Cables, Seismogram Digger, Survey diagrams, etc.	• Carry out seismic survey method • Identify seismic equipments	Demonstrate seismic survey method	Computer setting, Seismograph, Explosives, Geophones, Cables, Seismogram Digger, Survey diagrams, etc.

	General Objective: 2.0: Know how to process and interprete seismic sections					
11-12	2.1 Explain 2 – D and 3 – D interpretation techniques. 2.2 Analyse seismic sections. 2.3 Conduct seismic interpretation of different structural styles: extensional, compressional, strike-slip, inverted, gravity dominated basins.	• Teach with seismic sections • Analyze seismic sections.	Visual Aids Computer Systems Text books White boards Markers Diagram samples of Seismic sections of 2-D, 3-D	• Conduct seismic interpretation of different structural styles	Carry out seismic interpretation of different structural styles	Diagram samples of Seismic sections of 2-D, 3-D Software
	General Objective: 3.0: Know the concept of seismic stratigraphy					
13-15	3.1 Analyze seismic facies 3.2 Create stratigraphic column using seismic straigraphy.	• Explain the concept of seismic stratigraphy	Visual Aids Computer Systems Text books White boards Markers Model samples	• Prepare Seismic Stratigraphy	Create Seismic Stratigraphy	Software Audio-visuals

Assessment: Coursework/ Assignments 10 %; Practical 40% Examination 50%

PROGRAMME: National INNOVATION Diploma in Petroleum Geoscience

COURSE: Basic Well Log Interpretation

SEMESTER 2: Year 1

CODE: PPG 108

DURATION: 45 Hours Lecture: 1 Tutorial: 0 Practical: 2

UNITS: 2

GOAL: This cause is designed to enable students understand the fundamentals of well logging operations and analyses

GENERAL OBJECTIVES:

On completion of this course, students should be able to:

1.0 Know importance of well logging.

2.0 Understand the electrical properties of subsurface materials

3.0 Know the relevant reservoir properties

4.0 Know how to develop logging programs

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE						
COURSE: Basic well log interpretation			**COURSE CODE**: PPG 108		**CONTACT HOURS**: 1-0-2	
GOAL: This course is designed to enable students understand the fundamentals of well logging operations and analyses						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0: Know importance of well logging					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1-4	1.1 Explain logging objectives 1.2 Define reservoir. 1.3 Illustrate invasion profile 1.4 State factors affecting borehole geophysics 1.5 Explain sidewall coring	• Describe the importance of well logging. • Explain invasion profile with the aid of diagrams • List out factors affecting logging operations	Magnetic Board	• Demonstrate side wall coring	Carry out side wall coring and analysis	-
	General Objective: 2.0: Understand the electrical properties of subsurface materials					
5-7	2.1 Describet all the passive and active electrical properties of earth	• State all electrical properties of the subsurface	Visual Aids Computer Systems	• Identify electrical logs.	Demonstrate the usage of electric logs	Laterolog tool Microlog

	material 2.2 List types of electrical logs. 2.3 Describe the use of a sonde	• Describe: - spontaneous potential log - Induction logs - Latlerolog - Microlog - Microlaterolog	Text books White boards Markers Logging tools	• Carry out logging operations with them. • Identify Sonde		tool SP log tool Microlog tool
	General Objective: 3.0: Know the relevant reservoir properties					
8-12	3.1 Define porosity 3.2 Determine porosity in clean formations 3.2 Describe formation resistivity factor. 3.3 Describe porosity log crosspolots. 3.4 Explain Archie's equations for clean sands. 3.5 Explain Rwa. 3.6 Determine porosity using resistivity crossplot method. 3.6 Explain permeability 3.7 Explain water saturation models for shaly sand.	• Explain with the use of: - Minerology logs, - Density logs - Neutron logs - Sonic logs - Porosity logs - Lithology logs • Use resistivity factor to calculate and anaylse • Use Archie's equation to calculatae and analyse. • Calculate resistivity of formation water	Visual Aids Computer Systems Text books White boards Markers Calculators	-	-	-
	General Objective: 4.0: Know how to develop logging programs					
13-15	4.1 Explain the importance of designing logging programs	• Describe logging programs design	Visual Aids Computer sets logs	• Carry out logging programs design • Carry out how to	Demonstrate logging programs design	Computer sets logs

	4.2 Design logging programs. 4.3 Evaluate logs with the use of computer	• Use computer to evaluate logs	Text books White boards Markers Logging tools	evaluate logs using computer	Demonsterate hoe to evaluate logs using computer	

Assessment: Coursework/ Assignments 10 %; Practical 40% Examination 50%

PROGRAMME: National INNOVATION Diploma in Petroleum Geoscience

COURSE: Fundamentals of Petrophysics

SEMESTER 2: Year 1

CODE: PPG 110

DURATION: 45 Hours Lecture: 1 Tutorial: 0 Practical: 2

UNITS: 2

GOAL: This course is designed to enable students have the knowledge of all physical quantities necessary in petrophysical methods for formation evaluation fluid flow principles

GENERAL OBJECTIVES:

On completion of this course, students should be able to:

1.0 Understand how to integrate the analysis of wire line logs and core data.

2.0 Understand seismic data analytical techniques and well logs analysis.

3.0 Know tools identification and selection

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE						
COURSE: Fundamentals of Petrophysics		**COURSE CODE**: PPG 110		**CONTACT HOURS**: 1-0-2		
GOAL: This course is designed to enable students have the knowledge of all physical quantities necessary in petrophysical methods for formation evaluation fluid flow principles						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0: Understand how to integrate the analysis of wire line logs and core data					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1-8	1.1 Explain the importance of integrating petrophysical methods. 1.2 State the different types of wire line logs. 1.3 List the applications of well logs and other special rod logs. 1.4 Explain open hole log evaluation process. 1.5State the importance of core analysis. 1.6 Explain cased hole log.	• Outline the objectives of petrophysics in reservoir analysis • Explain ,Porosity logs, lithology logs, permeability logs, wettability logs etc	Core samples, logs, etc.	• Demonstrate well login operations • Demonstrate coring and core analyses • Demonstrate cased hole logging operations	Carry out well logging activity Carryout core analyses and coring activity	Logging tools

	General Objective: 2.0: Understand seismic data analytical techniques and well logs analysis					
9-13	2.1 Briefly explain seismic methods 2.2 Describe analysis of seismic sections. 2.3 Integrate well log and seismic method 2.4 State the tools relevant to well logs and seismic methods.	• State the types of seismic method and their mode of operations • Describe the collection of well log and seismic data and complement both analyses • Involve students in the analysis.	Well log samples, gas detect , gas chromatography, Core Samples, Geophysical equipments	• Demonstrate the uses of well log tools and seismic method equipments • Interpret Seismic profile	Carryout the well logging and seismic operations	Porosity log tool, Sonde, sonic log tool, caliper log tool, electric log tool
	General Objective: 3.0: Know tools identification and selection					
14-15	3.1 List out tools used in petrophysics method 3.2 Identify which tools is most effective for specific application	• Explain the uses of petrophysical tools and their relevance	Petrophysical logging tools	• Identify tools used in petrophysics	Carry out identification of tools used in petrophysics	Petrophysical logging tools

Assessment: Coursework/ Assignments 10 %; Practical 40% Examination 50%

PROGRAMME: National INNOVATION Diploma in Petroleum Geoscience

COURSE: Coring and Core Analysis

SEMESTER 2: Year 1

CODE: PPG 112

DURATION: 45 Hours Lecture: 1 Tutorial: 0 Practical: 2

UNITS: 2

GOAL: This course is designed to enable students understand the techniques involved in coring and core analysis

GENERAL OBJECTIVES:

On completion of this course, students should be able to:

1.0 Know the importance of designing coring programs

2.0 Understand the basic concept of core analysis

3.0 Know how to carryout quality control

4.0 Understand the correlation of log and core data

5.0 Know principles of coring techniques.

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE						
COURSE: Coring and Core Analysis			**COURSE CODE**: PPG 112		**CONTACT HOURS**: 1-0-2	
GOAL: This course is designed to enable students understand the techniques involve in coring and core analysis						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0: Know the importance of designing coring programs					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1-4	1.1 Explain the importance of coring and core analysis. 1.2 Explain how to design coring programs and maximize core recovery. 1.3 Describe core programs 1.4 Define petrography 1.5 Define mineralogy	• List out the objectives of designing coring programs • Explain the processes of designing coring programs • Explain the different crystal lattice structures.	Core samples	• Perform the design of coring and core programmes • Identify different minerals	Carry out the design of coring and core programmes Perform the identification of different minerals	Mineral samples
	General Objective: 2.0: Understand the basic concept of core analysis					
5-7	2.1 List out all relevant core properties 2.2 Estimate each of the core property listed in 2.1 above. 2.3Explain side wall coring 2.4 Identify special core properties	• Lecture on : porosity, permeability, fluid saturation • Calculate for each property in 2.2 • Determine : Wettability, Relative permeability,	Laboratory, Test kits, Gas detectors, Core samples Gas chromatography	• Determine the following: Porosity, permeability, fluid saturation e.t.c • Determine: wettability, relative permeability, fluid distribution.	Carry out basic core analysis of : porosity , permeability, fluid saturation e.t.c Carry out specialized core analyses of: Wettability,	Laboratory, Test kits, Gas detectors

		Reservoir fluid Saturation, Capillary pressure			Relative permeability, fluid distribution	
	General Objective: 3.0: Know how to carryout quality control					
8-9	3.1 Identify errors done by vendors 3.2 Assess contractors jobs and appraise	• List technical areas to lay emphasis on.	Vendors core assessment submissions, Case studies	-	-	-
	General Objective: 4.0: Understand the correlation of log and core data					
10-12	4.1 Explain the objectives of integration of log and core data 4.2 Describe data integration in reservoir simulations	• Relate the following with core data: nmr log caliberation, electric logs, nuclear logs,	Nmr log Electric log Nuclear log	• Correlate log and core data • Carry out data integration in reservoir simulations	Carry out integration of core logs and well logs Demonstrate data integration in reservoir simulations	Nmr log Electric log Nuclear log Computer
	General Objective: 5.0: Know principles of coring techniques					
13-15	5.1 Explain well sites procedures. 5.2 Describe core handling 5.3 Describe core preservation. 5.4 List core presentation methods.	• Discuss core preservation and presentation with students	Core samples	• Demonstrate well site operation • Demonstrate core preservation and presentation	Carryout well site operation Carry out core preservation and presentation	Core samples Logging tools

Assessment: Coursework/ Assignments 10 %; Practical 40% Examination 50%

PROGRAMME: National INNOVATION Diploma in Petroleum Geoscience

COURSE: Well Log and Core Data Integration

SEMESTER 2: Year 1

CODE: PPG 114

DURATION: 45 Hours Lecture: 1 Tutorial: 0 Practical: 2

UNITS: 2

GOAL: This course is designed to acquaint the student on how log and core data can be integrated for improved reservoir description.

GENERAL OBJECTIVES:

On completion of this course, students should be able to:

1.0 Understand the interpretation of wire line logs.

2.0 Understand how to analyze core data.

3.0 Know the integration of well logs and core data**.**

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE						
COURSE: Well Log and Core Data Integration			**COURSE CODE**: PPG 114		**CONTACT HOURS**: 1-0-2	
GOAL: This course is designed to acquaint the student on how log and core data can be integrated for improved reservoir description.						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0: Understand the interpretation of wire line logs.					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1-9	1.1 Explain the concept of log interpretation. 1.2 Explain reservoir rock characteristics 1.3 Outline the uses of relevant logs. - litho logic logs - Fluid logs. - combination porosity logs - Porosity logs, 1.4 Explain log calibrations. 1.5 Describe the conventional interpretation techniques and calculations using: - formation factor - Arch i.e. equations for clean sands. - crossplot method - R_{WA} method - Ratio method	• Explain an overview of logging interpretation and operations • Outline characteristics of: clastic reservoir rocks, carbonate reservoir rocks e.t.c • Read the quantitative values expressed on well logs in 1.3 • Explain what operation each log 1.3 carries out • Calibrate different logs • Calculate using methods in 1.5	Model samples Computer set Rock samples Logs Lithology log tool Fluid log tool Porosity log tool	• Demonstrate the uses of the logs 1.3	Carry out the use of the different logs in 1.3	Model samples Computer set Rock samples Logs Lithology log tool Fluid log tool Porosity log tool.

	General Objective: 2.0: Understand how to analyze core data					
10-14	2.1 Describe physical parameters such as: - Porosity - Fluid Saturation - capillary pressure - Wet ability, etc. 2.2 List out types of analysis and measurement scales: - conventional - complementary, etc.	• Explain the physical properties in 2.1 • Outline different types of core analyses	Core and mud samples Well logs.	• Determine the physical properties in 2.1	Carry out determination of physical properties in 2.1	Core and mud samples Well logs.
	General Objective: 3.0: Know the integration of well logs and core data					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
15	3.1 Describe how to collect core and log data 3.2 Integrate both data in 3.1.	• Explain the integration of core and log data	Core data, well logs,	• Carry out the collection core and log data • Integrate core and log data	Demonstrate how to collect care and log data Demonstrate how to integrate core and log data	Core data samples Well logs.

Assessment: Coursework/ Assignments 10 %; Practical 40% Examination 50%

PROGRAMME: National INNOVATION Diploma in Petroleum Geoscience

COURSE: Concepts of Dynamic Modelling

SEMESTER 2: Year 1

CODE: PPG 116

DURATION: 75 Hours Lecture: 2 Tutorial: 0 Practical: 3

UNITS: 3

GOAL: This course is designed to enable student have knowledge of determining optimal rate of depletion of reservoirs

GENERAL OBJECTIVES:

On completion of this course, students should be able to:
1.0 know data validation and review
2.0 Know wells and field performance
3.0 Understand the concept of reserve calculation
4.0 Understand the concept of reservoir simulations

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE						
COURSE: Concept of Dynamic Modelling			**COURSE CODE**: PPG 116		**CONTACT HOURS**: 2-0-3	
GOAL: This course is designed to enable student have knowledge of determining optimal rate of depletion of reservoirs.						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	5.0 **General Objective**: 1.0: know data validation and review					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1-5	1.1 Explain the objectives of seismic data review 1.2 Outline the importance of carrying out geological data review 1.3 Describe the relevance of well log review 1.4 Explain the objectives of PVT review	• Explain the importance of 1.1, 1.2,1.3,1.4 to reservoir depletion study and assessement	Visual Aid	• Demonstrate the process of reviewing seismic data • Demonstrate the step by step process of reviewing the necessary geological data • Demonstrate well log review • Demonstrate PVT review	Carry out seismic data review of reservoir Carry out geological data review of reservoir Carry out well log review Carry out PVT review	Seismic data Geological data PVT data Well log data Software
	General Objective: 2.0: Know wells and fields performance review					
6-7	2.1 Describe production plots 2.2 Describe pressure plots	• Explain production status of reservoir and make comparisons • Explain pressure status of reservoir and make comparisons	Visual Aid Calculators	• Generate production plots • Produce pressure plots • Prepare Models	Carry out production plots Carry out pressure plots	Reservoir data Software Calculators Models

	General Objective: 3.0: Understand the concept of reserve calculation					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
8-10	3.1 Describe volumetric method of analysis 3.2 Describe material balance method of analysis 3.3 Describe decline curve	• Explain the use of volumetric method to quantify reserve • Quantify reserve using material balance	Calculators Software Sample models	• Demonstrate volumetric method of analysis • Demonstrate material balance of analysis • Generate decline curve reservoir	Carry out volumetric method Carry out material balance	Calculators Software Sample models
	General Objective: 4.0: Understand the concept of reservoir simulations					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
11-15	4.1 Describe reservoir simulations 4.2 Describe static model 4.3 Explain initialization 4.4 Describe history matching 4.5 Describe black- oil simulator	• Explain the concept of reservoir simulations	Calculators Software Sample models	• Demonstrate reservoir simulation • Demonstrate how to design a reservoir model • Perform history matching	Carry out reservoir simulation Carry out modeling Carry out history matching	Calculators Software Sample models

Assessment: Coursework/ Assignments 10 %; Practical 40% Examination 50%

PROGRAMME: National INNOVATION Diploma (NID) in Petroleum Geoscience

COURSE: Hydrocarbon Data System (HDS) Software

SEMESTER 1: Year 2

CODE: PPG 201

DURATION: 30 Hours Lecture: 0 Tutorial: 0 Practical: 4

UNITS: 2

GOAL: This course is designed to enable students acquires skills required to interpret cased hole and open hole logs.

GENERAL OBJECTIVES:

On completion of this course, the student should be able to:

1.0 Understand the organization of the HDS Software.

2.0 Know how to input data into the HDS Software.

3.0 Know how to perform Petrophysical calculations with the HDS Software.

4.0 Know how to perform advanced calculations with HDS Software.

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE						
COURSE: Hydrocarbon Data System (HDS) Software .		**COURSE CODE**: PPG 201		**CONTACT HOURS**: 0-0-4		
GOAL: This course is designed to enable students acquires skills required to interpret cased hole and open hole logs.						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0: Understand the organization of the HDS Software					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1-6	-	-	-	1.1 Demonstrate the organization of the HDS software 1.2 Demonstrate how to set scales in the HDS software 1.3 Carryout curve selection in the HDS software	• Demonstrate the HDS software • Carryout curve selection with the HDS software • Carryout scale selection with the HDS software	Power point Projector, A Laptop computer, the HDS software, white board markers, well logs Digitizers, software user manual.

	General Objective: 2.0: Know how to input data into the HDS Software					
7-10	-	-	-	2.1 Perform the data input process 2.2 Digitize a well log 2.3 Demonstrate how to set the scales to match the Digitized logs.	• Demonstrate how to match the Digitized log to a proper scale. • Carryout log digitization with the HDS software • Carryout scale adjustment with the HDS software	Power point Projector, A Laptop computer, the HDS software, white board markers, well logs Digitizers, software user manual.
	General Objective: 3.0: : Know how to perform petropyhsical calculations with the HDS Software					
11-12	3.1 Explain the theory behind Resistivity measurements 3.2 Explain the theory behind vshale calculations	• Explain the theoretical concepts underlying resistivity vshale calculations .	Textbooks presentation slides, audio visuals, white board markers Understand the correlation etc.	3.1 Demonstrate temperature correction for Rw 3.2 Demonstrate vshale Multiple formulations 3.3 Perform sonic log calculation	• Demonstrate Temperature correction for Rw • Carryout vshale volume calculations	Power point Projector, A Laptop computer, the HDS software, white board markers,

				3.4 Carryout 2-mineral modeling 3.5 Analyze the Neutron-Density options	• Carryout Neutron density calculations	well logs Digitizers, software user manual.
	General Objective: 4.0: : Know how to perform advanced calculations with the HDS Software					
13-15	4.2 Explain the theoretical principles in clay volume calculations 4.2 Explain the theory underlying the Pickett plots 4.3 Explain the theory underlying the Hingle cross plots.	• Explain the concepts in clay volume calculations , Pickett plots and the Hingle cross plot	Textbooks presentation slides, projector, white board marker	4.1 Calculate clay volumes information 4.2 Demonstrate how to use the formation marker in the HDS software 4.3 Demonstrate how to input core data into HDS 4.4 Carryout input perforation Data 4.5 Generate Pickett plots 4.6 Generate Hingle cross plots	• Demonstrate how to carryout clay volume calculations • Carryout formation marking in the HDS environment • Demonstrate core data input, Pickett plots and Hingle crossplots with a decaled example	Power point Projector, A Laptop computer, the HDS software, white board markers, well logs Digitizers, software user manual.

Assessment: Coursework/ Assignments 10 %; Practical 60% Examination 30%

PROGRAMME: National INNOVATION Diploma (NID) in Petroleum Geoscience

COURSE: Petrel Software

SEMESTER 1: Year 2

CODE: PPG 203

DURATION: 30 Hours Lecture: 0 Tutorial: 0 Practical: 4

UNITS: 2

GOAL: This course is designed to enable students acquire skills for seismic interpretation, Petropyhsical analysis and Modelling static

GENERAL OBJECTIVES:

On completion of this course, the student should be able to:

1.0 Understand Seismic data modelling.

2.0 Know how to input and build static (geological) model

3.0 Know how to carry out petrophysical analysis

4.0 Know how to perform carry out reserve estimation from static model

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE						
COURSE Petrel Software		**COURSE CODE**: PPG 203		**CONTACT HOURS**: 0-0-4		
GOAL: This course is designed to enable students acquire skills for seismic interpretation, Petropyhsical analysis and Modelling static						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0: This course is designed to enable students acquire skills for seismic interpretation, Petropyhsical analysis and Modelling static					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1-3	1.1 Explain the quality control and data validation process in static modelling	• Explain why data validation is required • Describe the data validation process	Audio-visual aids, textbooks, markers and a white board marker	1.1 Demonstrate the organization of the Petrel software 1.2 Import seismic data 1.3 Conduct seismic data validation 1.4 Import well data into Petrel software	• Demonstrate the use of Petrel • Carryout seismic data importation	Projectors computers with Petrel software, white board, marker, software manual.
	General Objective: 2.0: Know how to input build static (geological) model					
4-9	-	-	-	2.1 Import Seismic data 2. 2 Import well log and deviation data 2.3 Perform quality	• Demonstrate the static modelling workflow	Projectors computers with Petrel software,

				check of seismic and well log data 2.4 Demonstrate seismic or fault modelling 2.5 Practicalize facies modelling 2.6 Correlate well logs 2.7 Carryout depth conversion and volume rendering 2.8 Demonstrate well to seismic matching		white board, marker, software manual.
	General Objective: 3.0: : Know how to carry out petrophysical analysis					
10-13	3.1 Explain deterministic and stochastic Petropyhsical modelling 3.2 Explain how these Petropyhsical properties are used for reserve estimation	• List the different Petropyhsical properties and describe each of them • Explain how each of this properties are estimated by the software	Textbooks, visual aids, markers, white boards etc.	3.1 Analyze log data to obtain petropyhsical properties 3.2 Carryout deterministic and stochastic petropyhsical modelling 3.3 Demonstrate how petropyhsics affects static model	• Demonstrate petropyhsical modelling in petrel • Give guided example and exercises in Petropyhsical modelling in Petrel	Projectors computers with Petrel software, white board, marker, software manual.

	General Objective: 4.0: Know how to perform carry out reserve estimation from static model					
14-15	-	-	-	4.1 Import all required data for a static model 4.2 Interpret faults and horizons 4.3 Carryout structural mapping 4.4 Demonstrate Petropyhsical modelling 4.5 Carryout reserve estimation in the Petrel environment 4.6 Upscale static model	• Demonstrate how to build a static model and use it for reserve estimation	Projectors computers with Petrel software, white board, marker, software manual.

Assessment: Coursework/ Assignments 10 %; Practical 60% Examination 30%

PROGRAMME: National INNOVATION Diploma (NID) in Petroleum Geoscience

COURSE: Geographix Software

SEMESTER 1: Year 2

CODE: PPG 205

DURATION: 30 Hours Lecture: 0 Tutorial: 0 Practical: 4

UNITS: 2

GOAL: This course is designed to enable students acquire skills in seismic interpretation

GENERAL OBJECTIVES:

On completion of this course, the student should be able to:

1.0 Understand the use the Geographix software for seismic interpretation

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE						
COURSE: Geographix Software			**COURSE CODE**: PPG 205		**CONTACT HOURS**: 0-0-4	
GOAL: This course is designed to enable students acquire skills in seismic interpretation						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0: Understand the use the Geographix software for seismic interpretation					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1-15	1.1 Explain the Geographix software and what it can do	• Describe the Geographix software • List out what the software can be used for	Projectors visual aids, user manual, white board marker, markers, etc.	1.1 Demonstrate the organization of the Geographic software 1.2 Import seismic data 1.3 Demonstrate seismic validation procedure 1.4 Import quality check well data 1.5 Correlate well data 1.6 Import well deviation data 1.7 Carryout well and seismic matching 1.8 Analyze log data 1.9 Carryout fault interpretation 1.10 Carryout the interpretation of horizons	• Demonstrate the use of Geographix software • Demonstrate how to import seismic data • Demonstrate how to correlate and check well data • Demonstrate how to import deviation data • Demonstrate well and seismic	Geographix software and others

				1.11 Carry out structural mapping output of seismic section/profile.	matching • Demonstrate fault interpretation • Demonstrate interpretation of horizons • Demonstrate structural mapping output of seismic section/profile	

Assessment: Coursework/ Assignments 10 %; Practical 60% Examination 30%

PROGRAMME: National INNOVATION Diploma (NID) in Petroleum Geoscience

COURSE: Monte Carlo Software

SEMESTER 1: Year 2

CODE: PPG 207

DURATION: 30 Hours Lecture: 0 Tutorial: 0 Practical: 4

UNITS: 2

GOAL: This course is designed to equip the students with skills in statistic analysis

GENERAL OBJECTIVES:

On completion of this course, the student should be able to:

1.0 Understand how to use the Monte Carlo Software

2.0 Understand the Uncertainties in reserve estimation.

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE						
COURSE: Monte Carlo Software		**COURSE CODE**: PPG 207		**CONTACT HOURS**: 0-0-4		
GOAL: This course is designed to equip the student with skills in statistic analysis						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0: Understand how to use the Monte Carlo Software					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1-9	1.1 Explain different Probability distribution functions	• Explain different Probability distribution functions	Audio-visual aids, textbooks, markers and a white board marker	1.1 Demonstrate the organization of the Monte Carlo software 1.2 Carry out different probability distribution functions using Monte Carlo 1.3 Perform the impute of petropyhsical values in Monte Carlo 1.4 Apply Monte Carlo software for reserve estimation	• Demonstrate the Monte Carlo software • Demonstrate different probability distribution functions using Monte Carlo • Demonstrate how to impute petrophysical values in Monte Carlo • Demonstrate the use of Monte	Visual aids – power point presentation, computer systems/software.

					Carlo software for reserve estimation	
	General Objective: 2.0: Understand the Uncertainties in reserve estimation.					
10-15	-	-	-	2.1 Estimate Probable, possible and proven reserves 2. 2 Describe quality uncertainties in reserve estimation 2.3 Carryout SEC and SPE classification of reserves 2.4 Estimate risk assessment in reserve classification	• Demonstrate how to effectively use Monte Carlo for: -Reserve estimation -Reserve classification -Quantifying risks in reserve estimate.	Visual aids – power point presentation, computer systems/software.

Assessment: Coursework/ Assignments 10 %; Practical 60% Examination 30%

PROGRAMME:	National INNOVATION Diploma (NID) in Petroleum Geoscience
COURSE:	Roxar Software
SEMESTER 1:	Year 2
CODE:	PPG 209
DURATION:	30 Hours Lecture: 0 Tutorial: 0 Practical: 4
UNITS:	2
GOAL:	This course is designed to equip the students with skills in static and dynamic modelling with Roxar

GENERAL OBJECTIVES:

On completion of this course, the student should be able to:

1.0 Understand how to build a static model with Roxar

2.0 Understand how to build a dynamic model with Roxar

3.0 Know how to evaluate results of Petrel against Roxar.

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE						
COURSE: Roxar Software		**COURSE CODE**: PPG 209		**CONTACT HOURS**: 0-0-4		
GOAL: This course is designed to equip the students with skills in static and dynamic modelling with Roxar						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0: Understand how to build a static model with Roxar					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1-7	1.1 Explain the Roxar software and 1.2 list its functions.	• Describe how the software works • Explain its functions. • Describe the workflow in Roxar	Audio-visual aids, textbooks, markers and a white board marker	1.1 Demonstrate the Roxar software 1.2 Carry out the data validation procedure 1.3 Perform the importation of data 1.4 Carryout well correlations 1.5 Carryout well to seismic matching 1.6 Demonstrate the structural mapping process 1.7 Carryout fault seal modelling 1.8 Demonstrate boundary mapping 1.9 Carryout facies	• Demonstrate the static modelling procedure with Roxar software • Demonstrate data validation procedure • Demonstrate importation of data using Roxar • Demonstrate well to seismic matching • Carry out structural mapping process	Roxar software

				modelling 1.10 Carry out estimate of reserve with Roxar 1.11 Carryout depth conversion	• Demonstrate boundary mapping • Demonstrate facies modelling • Demonstrate estimation of reserve with Roxar • Demonstrate depth conversion with Roxar	
	General Objective: 2.0: Understand how to build a dynamic model with Roxar					
8-12	-	-	-	2.1 Demonstrate how to upscale the state model 2.2 Import well hydraulic data 2.3 Perform grid refinement 2.4 Validate PVT data 2.5 Carryout relative permeability analysis 2.6 Perform special core analysis (SCAL)	• Demonstrate the dynamic modelling processes using real industry examples	Roxar software

				2.7 Carryout production industry validation 2.8 Predict production performance		
	General Objective: 3.0: Know how to evaluate, results of Petrel against Roxar.					
13-15	-	-	-	3.1 Export reserve values to Excel from Roxar and from Petrel 3.2 Carryout a spreadsheet analysis to compare the difference in the results. 3.3 Demonstrate the difference using graphical analysis.	• Carryout comparison analysis in Excel	Roxar software

Assessment: Coursework/ Assignments 10 %; Practical 60% Examination 30%

PROGRAMME: National INNOVATION Diploma (NID) in Petroleum Geoscience

COURSE: Workbench Software

SEMESTER 1: Year 2

CODE: PPG 211

DURATION: 30 Hours Lecture: 0 Tutorial: 0 Practical:4

UNITS: 2

GOAL: This course is designed to equip student with skills in inflow performance relationship and equipment design

GENERAL OBJECTIVES:

On completion of this course, the student should be able to:

1.0 Know how to design inflow performance relationship

2.0 Know how to design vertical lift curves

3.0 Know how to design equipments (Gas lift, separators, tubing etc.)

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE						
COURSE: Workbench Software		**COURSE CODE**: PPG 211		**CONTACT HOURS**: 0-0-4		
GOAL: This course is designed To equip student with skills in inflow performance relationship and equipment design						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0: Know how to design inflow performance relationship					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1-5	1.1 Explain the theoretical concept of the inflow performance relationship 1.2 Explain how the inflow curves are used	• Describe the inflow performance concept. • State the uses of the inflow curves and describe how they can be optimized and used.	Audio visuals	1.1 Demonstrate the Workbench software 1.2 Input data into the workbench software 1.3 Generate the flow performance relationship 1.4 Optimize the inflow performance curves.	• Demonstrate the workflow for generating inflow performance curves.	Workbench software

	General Objective: 2.0: Know how to design vertical lift curves					
6-8	2.1 Explain the of vertical lift design and describe the data requirements for vertical lift design	• Describe the VLP design concept and data requirements using real industry examples.	Workbench software	2.1 Demonstrate the procedure for VLP data input 2.2 Carryout the VLP design procedure in workbench environment 2.3 Export VLP data from workbench	• Demonstrate how to use workbench for VLP design	Workbench software
	General Objective: 3.0: Know how to design equipments using Work bench (Gas lift, separators, tubing etc.).					
9-15	3.1 Describe the flow assurance concept 3.2 List the requirements for choke design 3.3 Describe gas cusping and water coring	• Explain flow assurance choke design theory and the coring phenomenon in Petroleum reservoirs.	Workbench software	3.1 Carryout gradient Analysis in workbench. 3.2 Demonstrate Gas lift design and optimization 3.3 Use workbench for well design 3.4 Demonstrate choke design 3.5 Demonstrate flow assurance issues in workbench 3.6 Carryout water coring and Gas cusping in workbench.	Carryout comparison analysis in Excel	Workbench software

Assessment: Coursework/ Assignments 10 %; Practical 60% Examination 30%

PROGRAMME: National INNOVATION Diploma (NID) in Petroleum Geoscience

COURSE: Prosper Software

SEMESTER 1: Year 2

CODE: PPG 213

DURATION: 30 Hours Lecture: 0 Tutorial: 0 Practical:4

UNITS: 2

GOAL: This course is designed to expose students to the practical applications of prosper for well modelling.

GENERAL OBJECTIVES:

On completion of this course, the student should be able to:

1.0 Understand how to carryout well modelling with Prosper

2.0 Know how to design Gas lift and completion with prosper

3.0 Know how to predict performance with prosper.

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE						
COURSE: Prosper Software		**COURSE CODE**: PPG 213		**CONTACT HOURS**: 0-0-4		
GOAL: This course is designed to expose students to the practical applications of prosper for well modelling.						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0: Understand how to carryout well modelling with Prosper					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1-8	1.1 Explain the different concepts in well design such as: - Pressure losses along the wellbore - Maximum efficiency rate - Multiphase flow in wells - Liquid holding along the wellbore	• Describe the concepts in well design using real industry examples.	Prosper software	1.1 Demonstrate the organization of Prosper 1.2 Validate DVT data 1.3 Demonstrate system analysis concepts 1.4 carryout pressure loss in wellbore 1.5 Produce inflow performance relationship (IPR) curves 1.6 Produce vertical lift performance curves. 1.7 Determine maximum efficiency rate (MER) 1.8 Carryout multiphase	• Carryout a complete well modelling using prosper software.	Prosper software

				flow design 1.9 Determine liquid holding 1.10 Use correlations to estimate liquid hold-up 1.11 Use moody diagrams 1.12 Generate oil phase envelop.		
	General Objective: 2.0: Know how to design Gas lift and completion with prosper					
9-10	-	-	-	2.1 Carryout Gas lift design 2.2 Carryout completion design	• Carryout Gas lift and completion design	Prosper software
	General Objective: 3.0: Know how to predict performance with prosper.					
11-15	3.1 List out relevant reservoir effects thus determine well performance	• Explain how these effects relates to well performance	Prosper software	3.1 Demonstrate reservoir effects on well performance. 3.2 Demonstrate History matching of reservoir 3.3 predict performance of reservoir 3.4 Demonstrate choke design	• Carry out determination of reservoir effects with prosper using real life example.	Prosper software

Assessment: Coursework/ Assignments 10 %; Practical 60% Examination 30%

PROGRAMME: National INNOVATION Diploma (NID) in Petroleum Geoscience

COURSE: Perform Software

SEMESTER 1: Year 2

CODE: PPG 215

DURATION: 30 Hours Lecture: 0 Tutorial: 0 Practical: 4

UNITS: 2

GOAL: This course is designed to equip the students with skills for optimal system analysis and design

GENERAL OBJECTIVES:

On completion of this course, the student should be able to:

1.0 Understand how to carryout system analysis – well performance modelling

2.0 Know how to evaluate well performance

3.0 Know how to design well completion.

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE		
COURSE: Perform Software	**COURSE CODE**: PPG 215	**CONTACT HOURS**: 0-0-4
GOAL: This course is designed to expose students to the practical applications of prosper for well modelling.		

COURSE SPECIFICATION: Theoretical Contents:	**Practical Contents**:

	General Objective: 1.0: Understand how to carryout system analysis – well performance modelling					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1-8	1.1 Describe the theory behind system analysis and well performance modelling.	• Explain the theory behind system analysis and well performance modelling.	Handout visual aids etc.	1.1 Demonstrate the organization of the perform software 1.2 Demonstrate data input and data validation 1.3 Carryout flow line gradient analysis 1.4 Model the down hole network 1.5 Generate VLP curves in perform 1.6 Carryout back pressure calculations	• Demonstrate system analysis and well performance modelling with performs using real industry examples and hands on exercises.	Perform software

	General Objective: 2.0: Know how to evaluate well performance					
9-11	-	-	-	2.1 Carryout back pressure calculations 2.2 Carryout flow-line design	• Demonstrate how to evaluate well performance	Perform software
	General Objective: 3.0: Know how to design well completion.					
12-15	-	-	-	3.1 Carryout effective tubing design 3.2 Demonstrate Gas-lift design 3.3 Carryout flow-line design 3.4 Carryout choke design	• Carryout well completion design using real industry examples with hands on exercises.	Perform software

Assessment: Coursework/ Assignments 10 %; Practical 60% Examination 30%

PROGRAMME: National INNOVATION Diploma (NID) in Petroleum Geoscience

COURSE: MBAL Software

SEMESTER 1: Year 2

CODE: PPG 217

DURATION: 30 Hours Lecture: 0 Tutorial: 0 Practical:4

UNITS: 2

GOAL: This course is designed to equip the students with practical application of material balance techniques and use of MBAL software

GENERAL OBJECTIVES:

On completion of this course, the student should be able to:

1.0 Know how to carryout maternal balance for a field or a reservoir.

2.0 Understand how to carryout decline curve analysis, reserve estimation to predict future production performance.

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE						
COURSE: MBAL Software		**COURSE CODE**: PPG 217		**CONTACT HOURS**: 0-0-4		
GOAL: This course is designed to equip the students with practical application of material balance techniques and use of MBAL software						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0: Know how to carryout maternal balance for a field or a reservoir.					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1-9	-	-	-	1.1 Demonstrate the interface and the organization of the MBAL software. 1.2 input reservoir and well data into MBAL 1.3 Validate input data 1.4 Carryout PVT modelling and SCALanalysis. 1.5 Estimate reserves 1.6 Carryout history matching and performance prediction 1.7 Evaluate different drive mechanisms	• Demonstrate material balance analysis with MBAL using core industry example and hands on interactive sessions.	Visual aids power point presentation, computer. MBAL software

	General Objective: 2.0: Understand how to carryout decline curve analysis, reserve estimation and predict future production performance.					
10-15	-	-	-	2.1 Carryout material balance for a reservoir 2.2 Perform history matching of actual production 2.3 Demonstrate breakthrough predictions 2.4 Carryout water-flood evaluation 2.5 Carryout fractional flow analysis 2.6 Decline curve analysis for reserve estimation and ultimate recovery determination.	• Demonstrate decline curve analysis, performance prediction and reserve estimation	Visual aids power point presentation, computer.

Assessment: Coursework/ Assignments 10 %; Practical 60% Examination 30%

PROGRAMME: National INNOVATION Diploma (NID) in Petroleum Geoscience

COURSE: Pansystem Software

SEMESTER 1: Year 2

CODE: PPG 219

DURATION: 30 Hours Lecture: 0 Tutorial: 0 Practical: 4

UNITS: 2

GOAL: This course is designed to equip the students with well test analysis and interpretation skills.

GENERAL OBJECTIVES:

On completion of this course, the student should be able to:

1.0 Understand the interpretation of well test data.

2.0 Know how to evaluate reservoir damage using Pansystem software

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE						
COURSE: Pansystem Software		**COURSE CODE**: PPG 219		**CONTACT HOURS**: 0-0-4		
GOAL: This course is designed to equip the students with well test analysis and interpretation skills.						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0: Understand the interpretation of well test data.					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	1.1 Conduct the review of well-test analysis concepts using Pansytem software 1.2 Explain the criteria for stimulation	• Explain well-test analysis	Visual aids power point presentation, computer. Pansystem software	1.1 Demonstrate the organization of Pansystem software 1.2 Validate gauge data 1.3 Import guage data 1.4 Analyze data 1.5 Generate derivative plots 1.6 Demonstrate History-matching 1.7 Perform model selection 1.8 Generate hornet plots.	• Demonstrate the whole concept involved in the interpretation of well test data.	Visual aids power point presentation, computer. Pansystem software

	General Objective: 2.0: Know how to evaluate reservoir damage using Pansystem software					
	-	-	-	2.1 Carryout davit analysis 2.2 Determine drainage volume 2.3 Estimate Productivity index. 2.4 Evaluate skin damage 2.5 Demonstrate KH characterization 2.6 Carryout average pressure estimation	• Demonstrate processes for evaluating reservoir damage from well test analysis.	Visual aids power point presentation, computer. Pansystem software

Assessment: Coursework/ Assignments 10 %; Practical 60% Examination 30%

PROGRAMME: National INNOVATION Diploma (NID) in Petroleum Geoscience

COURSE: Enrin (Saphir) Software

SEMESTER 1: Year 2

CODE: PPG 221

DURATION: 30 Hours Lecture: 0 Tutorial: 0 Practical: 4

UNITS: 2

GOAL: This course is designed to expose participant to practical well test interpretation with Saphir

GENERAL OBJECTIVES:

On completion of this course, the student should be able to:

1.0 Understand how to interprete well test data

2.0 Know how to evaluate reservoir damage and select candidates for stimulation

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE						
COURSE Enrin (Saphir) Software		**COURSE CODE**: PPG 221		**CONTACT HOURS**: 0-0-4		
GOAL: This course is designed to expose participant to practical well test interpretation with Saphir						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0: Understand how to interprete well test data					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1-10	1.1 Explain the basic concept of well test analysis and the different plots that can be used for well test interpretation	• Describe the entire well test interpretation process and explain the different plots and how they are used..	Visual aids power point presentation, computer.	1.1 Demonstrate the well test interpretation workflow. 1.2 Explain the well test software interface. 1.3 Quality check well test data 1.4 Load well test data and format the data 1.5 Carryout well test data analysis 1.6 Generate the derivative plot 1.7 Generate the honer plot 1.8 Carryout fault analysis 1.9 Estimate drainage volume using Enrin	• Demonstrate well test analysis using saphir using real industry examples.	Visual aids power point presentation, computer. Enrin software

				1.10 Carryout average pressure estimation.		
	General Objective: 2.0: Know how to evaluate reservoir damage and select candidates for stimulation					
11-15	2.1 Explain the criteria for selecting reservoir for stimulation	• Explain the criteria for selecting reservoir for stimulation	Visual aids power point presentation, computer.	2.1 Estimate permeability from well test data 2.2 Evaluate skin damage from well test data. 2.3 Carryout KH reservoir characterization 2.4 Demonstrate the process of candidate selection for stimulation	• Carry out the reservoir damage characterization procedure and using real industry examples to demonstrate the use of Enrin for reservoir damage evaluation.	Visual aids power point presentation, computer. Enrin software

Assessment: Coursework/ Assignments 10 %; Practical 60% Examination 30%

PROGRAMME:	National INNOVATION Diploma (NID) in Petroleum Geoscience
COURSE:	Eclipse Software
SEMESTER 2:	Year 2
CODE:	PPG 223
DURATION:	30 Hours Lecture: 0 Tutorial: 0 Practical: 4
UNITS:	2
GOAL:	The course is designed to expose students to practical reservoir evaluation using dynamic modeling techniques

GENERAL OBJECTIVES:

On completion of this course, the student should be able to:

1.0 Understand how to build a dynamic model for a reservoir.
2.0 know how to use the dynamic model for reserve validation, performance prediction, field development and field surveillance.

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE						
COURSE: Eclipse Software			**COURSE CODE**: PPG 223		**CONTACT HOURS**: 0-0-4	
GOAL: The course is designed to expose students to practical reservoir evaluation using dynamic modeling techniques						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0: Understand how to build a dynamic model for a reservoir					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1-10	1.1 Explain the concept of dynamic modeling 1.2 Description the procedures involved in building a reservoir dynamic model	• Describe the entire process of dynamic modeling for black oil and composition al simulation	Visual Aids Computer Systems Text books White boards Markers	1.1 Demonstrate the Eclipse software interface 1.2 Show what Eclipse can be used for 1.3 Carry out the validation of input data 1.4 Demonstrate data input procedure and import the static model 1.5 Import the fault data 1.6 Imput the VLP data 1.7 Import well deviation data 1.8 Import PVT and show how PVT data can be validated 1.9 Demonstrate how PVT data can be generated using Eclipse keywords 1.10 Demonstrate grid refinement in Eclipse 1.11 Demonstrate the	• Carry out how to build a dynamic model for a reservoir	Visual Aids Computer Systems Text books White boards Markers

				initialization procedure and reservoir volumetric determination in Eclipse 1.12 Demonstrate how to input well scheduled. 1.13 Carry out reservoir simulation in Eclipse		
	General Objective: 2.0: know how to use the dynamic model for reserve validation, performance prediction, field development and field surveillance					
11-15	-	-	-	2.1 Demonstrate how to history match performance data in Eclipse 2.2 Carry out performance prediction in Eclipse 2.3 Carry out sensitivity analysis in Eclipse	• Demonstrate the importance of the dynamic model and how the dynamic model is use in reservoir management	Visual Aids Computer Systems Text books White boards Markers

Assessment: Coursework/ Assignments 10 %; Practical 60% Examination 30%

PROGRAMME: National INNOVATION Diploma (NID) in Petroleum Geoscience

COURSE: CMG Suite (IMEX and GEM) Software

SEMESTER 2: Year 2

CODE: PPG 225

DURATION: 30 Hours Lecture: 0 Tutorial: 0 Practical:4

UNITS: 2

GOAL: The course is designed to enhance dynamic modeling skills of the students by exposing them to CMG Software.

GENERAL OBJECTIVES:

On completion of this course, the student should be able to:

1.0 Understand how to build a dynamic model using CMG Software
2.0 know how to use the built dynamic model for a reservoir management.

PROGRAMME: NATIONAL INNOVATION DIPLOMA IN PETROLEUM GEOSCIENCE						
COURSE: CMG Suite (IMEX and GEM) Software		**COURSE CODE**: PPG 225		**CONTACT HOURS**: 0-0-4		
GOAL: The course is designed to enhance dynamic modeling skills of the students by exposing them to CMG Software.						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0: Understand how to build a dynamic model using CMG Software					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
1-10	1.1 Explain the concept of black oil simulator (IMEX) 1.2 Explain the concept of the compositional oil simulator (GEM) 1.3 Describe the data requirements by the different simulators	• Explain the difference between GEM and IMEX simulators • Describe the data requirements	Visual Aids Computer Systems Text books White boards Markers User manuals	1.1 Demonstrate the CMG interface 1.2 Demonstrate how to navigate in the CMG environment 1.3 Demonstrate how to input data into CMG 1.4 Carry out static model and VLP data input 1.5 Input all the Petrophysical data 1.6 Carry out how to import well deviation data 1.7 Carry out PVT data input and validation in CMG 1.8 Carry out SCAL analysis 1.9 Demonstrate how to input well scheduled and well events 1.10 Demonstrate how to simulate the dynamic	• Carry out dynamic modeling workflow using IMEX simulator with practical industry data • Carry out the compositional simulation workflow using GEM with industry examples and hands on exercises	CMG Suite Laptops Projector Text books White boards Markers

				model to obtain well volumetric		
	General Objective: 2.0: know how to use the built dynamic model for a reservoir management					
11-15	-	-	-	2.1 Demonstrate how to history match the simulated data to actual production data 2.2 Carry out performance prediction in CMG 2.3 Demonstrate how to use the dynamic model to make reservoir management decisions 2.4 Demonstrate how scenarios can improve our understanding of the reservoir	• Demonstrate the importance of reservoir models and how these models can improve reservoir understanding and management	CMG Software Laptops Projector Text books White boards Markers

Assessment: Coursework/ Assignments 10 %; Practical 60% Examination 30%

INDUSTRIAL MODULE

The Industrial module will last for fifteen (15) weeks where the students will carry out a group project with industrial application. This module is a creative module where students will put what they have learnt into practical creative use.

MINIMUM PHYSICAL FACILITIES REQUIRED FOR THE PROGARMME

Minimum Physical Facilities Required for Petroleum Geoscience National INNOVATION Diploma (NID)

Laboratory	Workshop
i) Geological and Geophysical ii) Elementary Computer iii) Software iv) Chemical Analysis	i) Equipment/Modelling/Drilling

1. Geological and Geophysical Laboratory

S/No	Description	Quantity
1.	Mineral and Rock Samples	5 of each
2.	Log Samples	4 each
3.	Ore Microscopes	3
4.	Stereomicroscope	2
5.	Lens of various magnification (x10, x100, x1500)	4 each
6.	Petrological Microscope	3
7.	Rock grinding and polishing machine	1
8.	Geological models	Assorted
9.	Geological Hammers	1
10.	Sedimentometer for particle size analysis	1
11.	Water level indicator	2
12.	Mechanical sieve	1
13.	Atomic Absorption Spectrometer	1
14.	pH meter	1
15.	Magnetometer	2
16.	Gravimeter	2
17.	Seismograph	2
18.	Laboratory work benches	6
19.	Air Conditioner for the laboratory	2
20.	Geophones	5
21.	Cathetometer	1
22.	Aneroid Barometer	1
23.	Gasometer	2
24.	DYMO level writer	2

2. Elementary Computer laboratory

S/No	Description	Quantity
1.	Computer set	40
2.	Computer table	40
3.	Smart Ups	40
4.	Air Conditioner for the laboratory	2
5.	Microsoft office	

3. Software laboratory

S/No	Description	Quantity
1.	Groundwater Modeling System Version 3.0	4
2.	Surfacewater Modeling System Version 3.0	4
3.	Watershed Modeling System Version 3.0	4
4.	Air Conditioner for the laboratory	2
5.	PVT Record Version 2.0	4
6.	National Instruments (Data Acquisition Drive Software for Windows 2000/NT/9X, Ver.6.7	4
7.	Euro Osmo 7000(Knauer) for Windows	4
8.	Packets of Microsoft office 2000 standard diskettes	8
9.	Image creation and recovery CD-ROM (Getting started)	Many
10.	Laptop/Desktop	40
11.	System Recovery for note books	-
12.	Fluke digital thermometer software	4
13.	SRI Peak simple for windows chromatographic software	4
14.	Blue Heat: Windows NT 4.0 V2.24	4
	Windows 95 V1.14	4
	QNX 4.2X V4.23K	4
15.	D.R Robinson Pump control V3.20	4
16.	D.R Robinson PVT V3.20	4
17.	Anton Paar GMdh software	4
18.	Digital Camera	20
19.	Printers	4
20.	DBR Solid Detection System software	3

4. Equipment/Modelling/Drilling Workshop

S/No	Description	Quantity
1.	Pillar drilling machine	2
2.	Bench drill machine	2
3.	Drill sets in boxes	2 of each
4.	Pipe and vice	3
5.	Casing collars	2
6.	Casing packets	1
7.	Model drilling rig	1
8.	Casing mill	1
9.	Air Compressor	2
10.	Flow meter	4
11.	Moisture trap	2
12.	Fittings and plugs	-
13.	Thermo well	2
14.	Petro Gas hose	1
15.	Mass set	2
16.	Plug-In Transformer	2
17.	Polystat bath	2
18.	CCD Video Level	2
19.	Triniton Video Monitor	2
20.	Displacement Pump	2
21.	Equilibrium Flash separator	2

5. Chemical Analysis Laboratory

S/No	Description	Quantity
1.	Cell Glass Tube	-
2.	Pyrex Glass Tube	-
3.	Phase Behavior Cell	2
4.	Recombination Cell	4
5.	Chromatograph	2
6.	Table Top (Gas Chromatography)	2
7.	Gas and liquid Chromatography	2
8.	Accuro Pump Gas Detector with Accessories	2
9.	Drager tube for onsite air quality control	4
10.	Spectrophotometer	2
11.	Portable Multiparameter Meter, pH, Conductivity,DO,BOD	4
12.	Turbidimeter with complete accessories	4
13.	Digital Titrator with cartridges	5
14.	Constant Temperature Bath	10
15.	Vapour Pressure Osmometer	3
16.	Vacuum Pump	3
17.	Rolling Ball Viscometer	4
18.	Density Meter	4
19.	Weighing balance	5
20.	Dew point taster unit	2
21.	HACH Complete Water Analysis kit	1
22.	Melter balance	2
23.	Viscometer	4

Safety Equipment

1.	First Aid Box	1
2.	Fire Extinguisher	3
3.	Sand buckets	3
4.	Safety charts and drawing	Assorted
5.	Safety goggles	30
6.	Safety helmets	30
7.	Safety boots	30
8.	Leather hand gloves	30
9.	Leather Apron	30
10.	Fire pump	2
11.	Sprinkler	1
12.	Hydrant	

Operator's Manual for Software laboratory

1. SRI Instruments Products Operational and Service Manual
2. DB Robinson Design & Manufacturing, Operation and Maintenance
3. INFCR Infinity C Programmer RTD meter Operator's Manual
4. CVS Dew point Tester Instruction Manual
5. DMA 38 User Manual
6. DBR Solid Detection System software maintenance guide Manual

LIST OF PARTICIPANTS

LIST OF PARTICIPANTS IN THE NATIONAL INNOVATION DIPLOMA (PETROLEUM GEOSCIENCE) CRITIQUE WORKSHOP

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