

FOREWARD



The reviewed **Basic Science Courses**, encompassing **Physics**, **Chemistry**, and **Biology**, designed for the National Diploma (ND) and Higher National Diploma (HND) Programmes represents the Board's recognition of the role of foundational scientific knowledge in nurturing competent and adaptable professionals for Nigeria's industries.

This review, the first since the curriculum's inception in 1999, was necessitated by the dynamic shifts in Technical and Vocational Education (TVE) and the imperative to meet the demands of the 21st century. This aims to ensure that our diplomates are not only equipped with specialized technical skills but also possess a robust scientific understanding that underpins innovation and problem-solving.

These reviewed Basic Science Courses is designed to instill learning, critical thinking and problem-solving abilities firmly grounded in scientific principles and promote an understanding of natural phenomena.

It is our profound hope that the effective implementation of this revised Basic Sciences Courses will empower our diplomates to apply their knowledge with confidence and contribute meaningfully to various sectors of the economy

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Introduction

The Basic Sciences Courses (General) are a foundational component of various National Diploma (ND) and Higher National Diploma (HND) Programmes, have remained largely unchanged since their development in 1999. A comprehensive review of these Basic Science courses was carried out to address the evolving needs of Technical and Vocational Education (TVE).

This aims to instill knowledge and skills beyond technical specialization, fostering critical thinking and problemsolving abilities grounded in scientific principles, and promoting a understanding of natural phenomena.

Specifically, the reviewed Basic Sciences Courses (Physics, Chemistry and Biology) are designed to equip students with:

- Improved critical thinking and problem-solving skills, cultivated through scientific methodologies.
- A foundational knowledge of fundamental scientific concepts across Physics, Chemistry, and Biology.
- Essential skills like numeracy and scientific literacy.

These integral elements of the Basic Sciences courses will produce diplomates who are not only technically proficient but also scientifically literate and capable of applying their knowledge to contribute meaningfully to society and various industries.

Lecturer Qualifications

Basic Sciences courses should primarily be taught by qualified lecturers from the Science Laboratory Technology (SLT) Department. In instances where qualified lecturers are unavailable within the SLT Department, the Department may employ the services of a qualified lecturer from another department within the same institution or engage one on a part-time basis.



Teaching Staff Requirements

Lecturers teaching SLT courses should possess relevant qualifications and experience, with a minimum of a Bachelor's degree in a relevant field.

- ND Courses: Should be taught by lecturers of Lecturer III rank and above.
- HND Courses: Should be taught by lecturers of Lecturer II rank and above

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CURRICULUM TARLE

CURR	RICULUM TABLE					107	
S/N	COURSE CODE	COURSE TITLE		L	P)	СН	CU
ND P	HYSICS, CHEMISTRY ANI	BIOLOGY COURSES					
1	STP 101	GENERAL PHYSICS I		2	1	3	3
2	STC 101	GENERAL CHEMISTRY I		2	1	3	3
3	STB 101	GENERAL BIOLOGY I		2	1	3	3
			V				

S/NI	COURSE CODE	COURSE TITLE		L	Р	СН	
			$\mathbf{\nabla}$	L	ľ	UH	
		AND BIOLOGY COURSES		2	1	3	
1	STP 301	GENERAL PHYSICS II		2	1		
2	STC 301	GENERAL CHEMISTRY II		2	1	3	
3	STB 301	GENERAL BIOLOGY II		2	1	3	
		A CONTRACTOR OF THE OPENING OF THE O					
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NATIONAL DIPLOM

COURSE TITLE: General Physics I YEAR: I SEMESTER: 0	COURSE CODE: STP 101	CONTACT HOURS: 3
		THEODETEAL
	CREDIT UNITS: 3 PRE-REQUISITE:	THEORETICAL: 2 PRACTICAL: 1
GOAL: The course is designed to acquaint stud		
GENERAL OBJECTIVES: On completion of		
1	· · · · · · · · · · · · · · · · · · ·	
1.0 Know the historical development of physics	s as a science	
2.0 Know the concept of motion		
3.0 Know the principle of operation of simple n	nachines	
4.0 Know the concept of energy		
5.0 Know the concept of waves		
6.0 Know the concept of electric and magnetic	fields.	
7.0 Understand the concept of thermodynamics		
ANIONALBOR		
ALLE		

	AMME: NATIONAL DIPL						
COURSE	E TITLE: General Physics I	CO	URSE CODE: S	STP 101		THOURS: 3	
			EDIT UNITS:			TICAL: 2	
EAR: I			E-REQUISITE	:	PRACTI	CAL: 1	
	SPECIFICATION: THE			-:	C DL	······································	
	The course is designed to acquine to acquine the course of		-		s of Physics	in everyday life.	
	ETICAL CONTENT	v the historical developh	lents of Fliysles	PRACTICAL	CONTEN	r	
		TEA CHEDIG	DEGOLIDO				DEGOLIDOE
WEEK	SPECIFIC LEARNING OUTCOME	TEACHER'S ACTIVITIES	RESOURCE	ES SPÉCIFIC LE	LAKINING	TEACHER'S ACTIVITIES	RESOURCE
1-2	development of scientific observations	 Explain the developmen of scientific observation and knowledge as science e.g.: Making of fire Free fall Movement af stars Law of flotation Motion of projectile (warfare) Burning glass 		Perform simple demonstrate sci principles: • Falling fro • Floating of water.	activities to ientific m a height	activities to demonstrate scientific	Floating object Free-falling objects
	Physics into different	Explain the growth of Physics into different areas such as:					



	modern applications of physics in their everyday life 1.7 List the industries and firms that require the services of physicists	applications of physics in their everyday life Explain the industries and firms that require the services of physicists				
GENE	RAL OBJECTIVE 2.0: Knov					
3-4	2.1 Define Motion	Explain motion	Textbooks Journals	Carryout experiments to	Guide student to: Carryout	Stop-watch
	 2.2 Explain the types of motion e.g. Translational Circular Rational Oscillatory etc. 	 Explain the types of motion e.g.: Translational Circular Rational Oscillatory etc. 	Whiteboard Marker Computer Internet Projector	 Carryout, experiments to Nustrate the following: Circular motion Rational motion S.H.M 	experiments to illustrate the following: • Circular motion • Rational motion • S.H.M	Beam balances Vernier callipers Meter ruler Simple
	2.4 Explain the cause of motion2.5 Define the following terms giving practical	Explain the application of each type of motion mentioned in 2.2 above Explain the cause of motion Explain the following terms giving practical fexamples of each one of		Demonstrate the methods of measurement of length time-using stop watch as in the application of simple pendulum and mass	Demonstrate the methods of measurement of length time-using stop watch as in the application of simple pendulum and mass	pendulum

examples of eac

	them:	them:		Perform experiments in the	Perform	
	• Speed	• Speed		measurement of mass using	experiments in the	
	Acceleration	 Acceleration 		beam balances, length 🛛 🔨	measurement of	
	• Velocity	• Velocity		using vernier callipers and	mass using beam	
	• Distance	• Distance		meter-ruler; time, using	balances, length	
	• Displacement	 Displacement 			using vernier	
				F	callipers and	
	2.6 Use mathematical	Use mathematical			meter-ruler; time,	
	expressions to solve	expressions to solve			using stop watch,	
	simple problems	simple problems			simple pendulum.	
NE	RAL OBJECTIVE 3.0: Know	w the principle of operation	n of simple mach	ines		
	3.1 Define a machine as a device which facilitates work	Explain machine as a device which facilitates work	Textbooks Journals Whiteboard	Perform simple experiments to illustrate the	Perform simple	Lever Pulleys
	WOIK	WOIK	Marker	principles of :	illustrate the	r uneys
	3.2 List simple machines	Explain simple machines				Inclined planes
	such as:	such as:	Internet	Inclined planes	Operation of	menned planes
	• Levers	• Levers	Projector	Pulleys	-	Hydraulic pres
	• Pulleys	• Pulleys	5	• Hydraulic press	 Inclined 	5 1
	Inclined planes	Inclined planes		• Trydraune press	planes	
	• Hydraulic press etc.	Hydraulic press etc.			• Pulleys	
	i i juiune press etc.	Trydrucke press etc.			 Hydraulic 	
	3.3 Cite instances of the	Explain instances of the			press	
	applications of each	applications of each type			L	
	type of machine in \mathcal{X}_2	of machine in 3.2 above				
	above in their everyday					
	life	5 5				

	3.4 Explain complex	Explain complex				
	machines as a	machines as a				
	combination of simple	combination of simple				
	machines e.g.:	machines e.g.:			\mathbf{N}	
	• Bicycles	• Bicycles				
	• Sewing machines.	Sewing machines.				
	etc.	etc.				
	3.5 List factors affecting	Explain factors affecting				
	motion for example air	motion for example air				
	resistance, viscosity,	resistance, viscosity, solid	1			
	solid friction as it	friction as it affects				
	affects machines	machines		*		
	3.6 State the advantages	Explain the advantages				
	and disadvantages of	and disadvantages of	\mathbf{Q}			
	friction	friction				
ra	l Objective 4.0: Know the c		<u> </u>	1		D 11
	4.1 Define work, energy,	Explain work, energy,	Textbooks	_	Guide student to:	Ball
	power and conversion	power and conversion of		Demonstrate	Demonstrate	D .
	of energy, stating their		Whiteboard	experimentally the effects	1 0	Ring
	units	units.	Marker	of heat energy e.g.:	the effects of heat	Τ
	4.2 State the law of	the law of	Computer	• Ball and ring	0, 0	Ice
	4.2 State the law of conversion of energy	Explain the law of conversion of	Internet Projector	experiment	• Ball and ring	Water
	conversion of energy		Projector	Melting of ice	1	
	4.3 List different types of	energy Explain the different		• Boiling of water to		Car battery
	energy:	types of energy:		form steam.	201111801	Cal Datiery
		Mechanical energy			water to form	Heating coi
	Mechanical energy	• Mechanical energy			steam	neating col

Chemical energy	Chemical energy	Perform simple	Perform simple	Touch Ligh
• Heat energy	• Heat energy	experiments to illustrate.	experiments to	bulbs
• Electrical energy	• Electrical energy	Conversion of energy from	illustrate	
• Sound energy	• Sound energy	one form to another	Conversion of	
• Light energy	• Light energy		•••	Beating dru
• Nuclear energy	• Nuclear energy		form to another	
			_	Metal rod
4.4 Explain simple	Explain simple practical		Perform	
practical problems	problems involving work		experiments to	Heating ma
involving work and	and energy		illustrate	
energy			conduction,	
		through a metal rod,		
4.5 Define temperature	Explain temperature	Convection in air and		
stating the various units		radiation through	• Conduction	
of measurement	units of measurement	different materials.	of heat	
		~	through a	
4.6 Distinguish between	Explain the differences	×	metal rod,Convection ir	
heat and temperature	between heat and		air and	
	temperature		radiation	
			through	
4.7 State the uses of the	State the user of the		different	
following types of	following types of		materials.	
thermometers:	thermometers:		materials.	
Mercury in glass	Mercury in glass			
• Alcohol in glass	Alcohol in			
• Gas-Volume	glass			
Thermometer	• Gas-Volume			
Clinical	Thermometer			

	Thermometer etc.Pyrometers etc.	 Clinical Thermometer etc. Pyrometers etc. 			JCA	
	4.8 Describe specific application of the above Thermometers in everyday life	Explain the specific application of the different types of thermometers in everyday life		JCAL EI		
enera 10	I Objective 5.0: Know the cost 5.1 Define waves	ncept of waves Explain waves	Textbooks 🗡		Guide student to:	Water
	 5.2 Explain the differences between mechanical and electro-magnetic waves 5.3 List examples of trans verse and longitudinal waves 5.4 List examples of sound waves 	differences between mechanical and electro- magnetic waves Explain examples of trans verse and longitudinal waves	Journals Whiteboard Marker Computer Internet Projector	Illustrate experimentally the concept of waves using examples such as: • Ripples on water • Waves on string • Helical string	 the concept of waves using examples such as: Ripples on water Waves on string 	Strings Beating drum Curved mirror Glass block Prism glass
	 5.5 Explain the differences between music and noise 5.6 Classify musical 	V		Conduct some simple experiments to demonstrate properties of waves:	Conduct some simple experiment to demonstrate properties of	

instruments:	instruments:	• Reflection	waves:
• String	• String	• Refraction.	• Reflection
instrument	instrument		Refraction.
• Wind	• Wind		
 Percussion 	Percussion		
			Measure angles
-	Explain the term Echo	Measure angles of incider	
= =	and state its application	and reflection	reflection
in everyday life, e.g.	in everyday life, e.g.		
1 0	depth finding, radar, oil		Conduct simple
prospecting etc.	prospecting etc.	Conduct simple experime	-
		to demonstrate different	demonstrate
5.8 List sources of light	Explain sources of light	sound produced by	different sound
		different instruments.	produced by
5.9 Explain the formation	Explain the formation of	▶ [*]	different
of shadows, eclipse,	shadows, eclipse, with		instruments.
with diagram	diagram		Identify the
5.10 Explain the	Explain the phenomenon	Identify the different	different sounds
phenomenon of	of reflection and	sounds produced by string	
reflection and refraction		wind and percussion	string, wind and
of light			percussion
			μ
5.11 Analyse descriptively	Analyse descriptively the		
the application of	application of reflection		
reflection and	and refraction of light as		Perform simple
refraction of light as	in:	Perform simple	experiments on
in:	Shaving mirror	experiments on reflection	reflection and
Shaving mirror	Driving mirror	and refraction:	refraction:

Driving mirror	• Reflectors		Plane mirror
Reflectors	Burning glass	Plane Mirror	Curved
Burning glass	Magnifying	• Curved mirror	mirror
Magnifying glass	glass	experiment,	experiment
		 Refraction through a 	Refraction
		glass block,	through a
-	Explain the phenomenon	Refraction through	glass block,
-	of apparent depth and	water	Refraction
11 1	mirage		through
mirage			water
5.13 List types of lenses –	Explain types of lenses –		Perform
• 1	diverging and converging	Perform experiment	experiment to
converging		to illustrate dispersion	illustrate
		of white light by	dispersion of
5.14 Explain the power of a	Explain the power of lens	prism and relate to its	white light by
lens		formation of rainbow.	prism and relate to
			its formation of
-	Explain the working of		rainbow.
-	some optical instruments and briefly describe their		
	uses:		
uses:	• Microscope		
Microscope	Telescope		
Telescope	Camera		
Camera	• Eye		
• Eye	Projector		
Projector			
- 110,000			

	5.16 Compare the eye and	Compare the eye and the				
	the camera	camera.				
	5.17 List the component of	Explain the component			\mathcal{S}	
	white light and	of white light and				
	rainbow	rainbow				
	5.18 Explain mixing of	Explain mixing of				
	colours as in coloured	colours as in coloured				
	television	television				
ENEF	RAL OBJECTIVE 6.0: Know	w the concept of electric a	nd magnetic field			I
-12	6.1 Explain and	Explain experimentally	Textbooks	\mathbf{N}	Guide students to:	Heating coil
	differentiate using	the following:	Journals 🔨	Perform simple	Perform simple	
	diagrams of the	Magnetic	Whiteboard	experiments to illustrate	experiments to	Electric bulb
	following:	field	Marker	various effects of:	illustrate various	Bells
	Magnetic	• Electric	Computer	• Electric current,	effects of:	
	field	field	Internet	• Heating effects as	• Electric	Loud speaker
	Electric field	Gravitation	Projector	in heating coil,	current,	1
	Gravitational	al field	5	 Electric bulbs 	· ·	Microphone
	field			Sound effects as	effects as in	
	neid	\mathbf{O}			heating coil	Torch bulb
	6.2 Explain the use of a	Explain the use of a		in bell, loud	Electric bulbs	
	6.2 Explain the use of a			speaker,		Wires
	compass	compass >		microphone	• Sound effects	
					as in bell, loud	Fuse
	6.3 Illustrate the electrical	Explain the electrical			speaker,	1 430
	wiring of a house and	-			microphone	Cable
	equipment using	equipment using series				Cable
	series and parallel	and parallel connection		Perform simple	Perform simple	Plug
	connection			experiment to show the	experiment to	riug

6.4 Explain the use of	Explain the use of fuses	relationship in above	show the
fuses and plugs in an	and plugs in an electrical	using torch bulb, wires	relationship in
electrical wiring	wiring	and relevant instruments	above using torch
			bulb and wires
6.5 Describe precautionary	Explain precautionary		and relevant
measures involved in	measures involved in		instruments
-	electrical wiring and		
use of electrical	use of electrical	Insert a fuse in an electric	Insert a fuse in an
appliances in homes,	appliances in homes,	socket	electric socket
industries and offices	industries and offices		
		Fix a cable into a plug	Fix a cable into a
	Explain common electric		plug
instrument and their	instrument and their uses		
uses e.g.:	e.g.:		
• Ammeters	• Ammeters	X	
• Voltmeters	• Voltmeters		
• Watt meters	• Watt meters		
• Ohmmeter	• Ohmmeter		
• Multimeter	• Multimeter		
6.7 Explain the uses of	Explain the uses of		
electromagnets in	electromagnets in		
dynamos, motors	dynamos, motors		
transformers, electric	transformers, electric bell,		
bell, telephone, loudspeakers	telephone, loudspeakers.		
6.8 Define Electric power	Explain Electric power		

						5
6	.9 Explain generation	Explain generation and				
-	and reception of radio	reception of radio and				
	and television signals	television signals				
ENERA	L OBJECTIVE 7.0: Und	_	modynamics		\sim	
-15 7	1.1 Define thermodynamics	Explain thermodynamics	Textbooks Journals	<	^N	
7	2.2 Explain thermodynamic	Explain thermodynamic	Whiteboard		*	
	systems	systems	Computer			
	-	-	Internet			
7	.3 Explain the laws of	Explain the laws of	Maker			
	thermodynamics	thermodynamics	Projector	\sim		
7	7.4 Explain practical examples of the applications of thermodynamics in daily lives	Explain practical examples of the applications of thermodynamics in daily lives	RTEC			
C/A:60 EXAM TOTA	IS: 40% L: 100%	RDF	5		I	
	ATOMA					
	5					
	Ak.					
-						

PROGRAMME: NATIONAL DIPLOMA (ND)		
COURSE TITLE: General Chemistry I	COURSE CODE: STC 101	CONTACT HOURS:3
	CREDIT UNITS: 3	THEORETICAL: 2
YEAR: I SEMESTER: 0	PRE-REQUISITE:	PRACTICAL:1
GOAL: This course is designed to acquaint students	with the basic principles Chemistry and	Ktheir applications in everyday life and society
GENERAL OBJECTIVES: On completion of this	course, the students should be able to:	Y
		× · · · · · · · · · · · · · · · · · · ·
1.0 Understand the scope and concept of science.		
2.0 Understand the concept of Chemistry.		
3.0 Understand the basic concepts of matter		
4.0 Understand the main constituents of air.		
5.0 Appreciate the importance of water in our societ	ty	
6.0 Know the general characteristics and properties	of acids, bases and salts.	
7.0 Understand the locally available metals, their so	urces, locations and economic importan	ce.
8.0 Know the nature and importance of organic com	ipounds.	
9.0 Understand the concepts of Chemical reactions.	$\Delta O'$	

derstand un ow the nature and important inderstand the concepts of Chemical reaction.

PROGR	AMME: NATIONAL DIPI	OMA CHEM	IISTRY				$\overline{\mathbf{v}}$	
	E TITLE: General Chemist			ODE : STC 101		CON	ACT HOURS: 3	
		C	CREDIT UN	ITS: 3		THE	ORETICAL: 2	
YEAR: I	SEMESTER: 0		PRE-REQ				TICAL:1	
	E SPECIFIFCATION: TH					V		
	This course is designed to acc				emistry and the	ir applicatio	ns in everyday life	and society
GENER	AL OBJECTIVE 1.0: Unde	-	e and concept	ot of science.				
	THEORETICAL CONTEN	NT			PRACTICAL	CONTENT		
WEEK	SPECIFIC LEARNING	TEACHER'	S	RESOURCES		EARNING	TEACHER'S	RESOURCE
	OUTCOME	ACTIVITIE			OUTCOME		ACTIVITIES	
-2	1.1 Define science.	Define science	2.	Text books				
			. 1	Journals				
	1 1	Explain the his	•	Whiteboard				
	philosophy of science.	philosophy of	science.	Marker Computer				
	1.3 Explain the relevance of	Explain the rel	levance of	Internet				
	science to man and	science to mar		Projector				
	society.	society.		5				
			Y					
	_	Explain the di						
	between Basic and	between Basic						
	Applied Sciences	Applied Scien	ces					
	1.5 List different 🖌 🚫	Explain differe	ont					
		1						
	Applied science	Applied science						

Ľ	RAL OBJECTIVE 2.0: Under	Explain chemistry as a	Text books			▶
	2.1 Explain chemistry as a branch of science.	branch of science.	Journals			
	branch of science.	oranen of science.	Whiteboard			
	2.2 Give examples of	Explain examples of	Marker			
	applications of	applications of chemistry	Computer			
	chemistry to man and	to man and society e.g.:	Internet	A	Y	
	society e.g.:	Production of salt	Projector			
	 Production of salt 	from hydro-chloric		C X Y		
	from hydro-chloric	acid and sodium				
	acid and sodium	hydroxide.				
	hydroxide.	Processing of crude				
	Processing of crude	oil into various				
	oil into various	products like				
	products like	gasoline, kerosene,				
	gasoline, kerosene,	gas, etc.				
	gas, etc.	Production of soap				
	Production of soap	(saponification)				
	(saponification)	Production of				
	• Production of cement	. cement.				
	• Production of shoe	 Production of shoe 				
	polish from charcoal	polish from charcoal				
	• Refining of vegetable	Refining of vegetable				
	oil.	oil.				
	2.3 List local chemical	Explain local chemical				
	industries and their	industries and their				
	products.	products.				

	CRAL OBJECTIVE 3.0: Unde 3.1 Define the three states	Explain the three states of	1			
)	of matter (solid, liquid	matter (solid, liquid and	Journals			
	and gas).	gas).	Whiteboard			
			Marker			
	3.2 Define an atom.	Explain an atom.	Computer			
			Internet			
	3.3 List the three main	Explain the three main	Projector		Y	
	constituents of an	constituents of an atom				
	atom.					
	3.4 Define an element, a	Explain an element, a	Ċ	XY .		
		molecule, a mixture and				
	a compound.	a compound				
	3.5 Explain the various	Explain the various				
	physical methods	physical methods of				
	of seperating a	seperating a mixture				
	mixture					
	3.6 Explain the relationship					
	between 3.2 and 3.4	between 3.2 and 3.4				
	above.	above.				
	3.7 Give the symbols and	Explain the symbols				
	valences of some common elements e.g.	and valences of some common elements				
	O_2 , N_2 H ₂ etc	e.g. O_2 , N_2 H ₂ etc.				
	02, N2 112 CR.	$c.g. O_2, N_2 \Pi_2 c.c.$				

	3.8 Determine the effect of heat and chemicals on different compound	Explain the effect of heat and chemicals on different				
	 e.g.: Lead nitrate Sodium sulphate(aq) + 	 compound e.g.: Lead nitrate Sodium sulphate(aq) 			EN	
	Ball(aq) • NQ2, S2, O3(aq) + Ball2(aq)	+ Ball(aq) • NQ2, S2, O3(aq) + Ball2(aq)		AICA		
EF	RAL OBJECTIVE 4.0: Unde					
	4.1 Outline the main constituents of air O₂, CO₂, N₂, rare gases and H₂O.	Explain constituents of air O_2 , CO_2 , N_2 , rare gases and H_2O .	Journals Whiteboard Marker			
	4.2 State the proportion by volume of each constituent in the air.	Explain the proportion by volume of each constituent in the air.	Computer Internet Projector Slides			
	4.3 Define air pollution	Explain air pollution				
	4.4 List the causes of air pollution.	Explain the causes of air pollution				
	4.5 State the consequences of air pollution.	Explain the consequences of air pollution.				

	4.6 Describe methods of	Explain methods of				
	checking air pollution.	checking air pollution.				
ENE	RAL OBJECTIVE 5.0: Appr		ater in our societ	у		
9	5.1 Define water as a	Explain water as a	Textbooks		Guide student to:	Hoffman
	universal solvent	universal solvent	Journals	Carry out the electrolysis	Carry out the	Voltmeter
			Whiteboard		electrolysis of water	
	5.2 Explain the constituents	Explain the	Marker	Voltmeter to identify the	using Hoffman	
	of water.	constituents of water.	Computer	constituents of water	Voltmeter to identify	Distiller
			Internet		the constituents of	
	5.3 List the properties of	Explain the properties of	Projector		water	
	water.	water.	Slides			
	5.4 List the sources of	Explain the sources		Carry out distillation of	Carry out distillation	
	water.	of water		water to produce distilled	of water to produce	
				water which can be used	distilled water which	
	5.5 Differentiate between	Explain the difference		for routine experiments in	can be used for	
	hard and soft water.	between hard and soft		laboratories and charging	routine experiments	
		water.		of batteries.	in laboratories and	
					charging of batteries.	
	5.6 Describe methods of	Explain methods of				
	softening hard water.	softening hard water				
	5.7 Describe methods of	Explain methods of				
	purifying drinking	purifying drinking water.				
	water.	$\mathbf{\nabla}$				
	5.8 Describe water cycle	Explain water cycle				
	5.9 List the causes of water	Explain the causes of				

	pollution.	water pollution.				
	5.10 List methods of	Evaluin mathada of				
	checking water	Explain methods of checking water pollution				
	pollution in our society	in our society				
ENEI	RAL OBJECTIVE 6.0: Know	•	and properties	of acids bases and sales	/	
)-11	6.1 Define acid, base and	Explain acid, base and	Textbooks		Guide students to:	Acid
, 11	salts.	salts.	Journals	Carry out simple test for	Carry out simple	
	Surts.	54115.	Whiteboard	acids, bases and salts.	test for acids, bases	Bases
	6.2 List examples of	Explain examples of	Marker	derds, ouses and suits.	and salts.	Duses
	common acids, bases,	common acids, bases, and			und suits.	Bunsen Burne
	and salts.	salts.	Internet	Use indicators to	Use indicators to	Dunisen Durne
			Projector	distinguish between acids,		Gas
	6.3 List the properties of	Explain the properties of	Slides	bases and salts.	between acids,	Gub
	acids, base and salts	acids, base and salts		oubes und suits.	bases and salts.	Burette
	actus, cuse and saits				ouses and suits.	Pipette
				Carry out acid base	Carry out acid base	i ipette
	6.4 Differentiate between	Explain the differences		titration.	titration.	Evaporating
	concentrated and	between concentrated and				dish
	diluted acids.	diluted acids.				aisii
	unuted uolus.			Obtain salt such as	Obtain salt such as	Volumetric
	6.5 Give examples of	Explain examples of		sodium chloride from sea	sodium chloride from	
	concentrated and	concentrated and diluted		water by evaporation	sea water by	ii iusk
	diluted acids.	acids.		process.	evaporation process.	Litmus naper
	unuted acrus.				evaporation process.	Litilius puper
	6.6 List uses of acids,	Explain uses of acids,				Wire gauze
	bases, and salts	bases, and salts				State Braze
		mentioned in 6.2 above.				Tripod Stand
						inpota Stanta

					JUCA	Retord Star
TENEL	AL OBJECTIVE7.0: Unde	rstand the locally available	metals their sou	rees locations and	economic important	Sea water
2-13	7.1 Define metals	Explain metals	Textbooks Journals			
	7.2 Describe the properties of metals	Explain the properties of metals	Whiteboard Marker Computer	Alt		
	 7.3 List the locally available metals e.g.: Iron and Steel Tin Aluminium Uranium etc. 	Explain the locally available metals e.g.: • Iron and Steel • Tin • Aluminium • Uranium etc.	Internet Projector Slides			
	7.3 List the places where the metals mentioned in 7.1 above are located.	Explain the places where the metals mentioned in 7.1 above are located.				
	7.4 Outline the method of purification of metals listed in 7.1 above.	Explain the methods of purification of metals listed in 7.1 above.				
	7.5 Explain the uses some common metals with specific examples.	Explain the uses some common metals with specific examples.				

	CRAL OBJECTIVE 8.0: Knov			ipounds.		1
4	8.1 Explain organic	Explain organic	Textbooks		Guide student to:	Millet
	compound	compound	Journals	Carry out an experiment to		
			Whiteboard	produce soap from palm	experiment to	Distillation
	8.2 Define hydrocarbons.	Explain hydrocarbons.	Marker	oil and potash rich ashes.	produce soap from	Apparatus
			Computer		palm oil and potash	
	8.3 Explain the class of	Explain the class of	Internet		rich ashes.	Soap
	organic compound	organic compound through	5			
	through the functional	the functional groups.	Slides.	Carryout an experiment to		Bunsen Burne
	groups.			produce ethanol through	experiment to	
				the fermentation of locally	-	Tripod Stand
	8.4 Outline the production	Explain the production		avajłable cereals.	through the	Wire Gauze
	process of petroleum	process of petroleum and			fermentation of	
	and its products from	its products from crude oil			locally available	Pyrex glass
	crude oil e.g.:	e.g.:			cereals.	
	• Petrol	• Petrol				Spatula
	• Kerosene	• Kerosene				
	• Plastic.	• Plastic.				Stirrer
	8.5 Explain the production	Explain the production of				Balance
	of soap through	soap through				
	saponification process.	saponification process.				Oil
	8.6 Differentiate between a	Explain the differences				Strong base
	soap and a detergent	between a soap and a				
		detergent.				Water bath
	8.7 Define alcohol	Explain alcohol				

8.8 Outline sour	rces of Ex	plain sources of				
alcohol	alc	cohol				
8.9 List differer alcohol		st different classes of cohol				
8.10 Outline the	e methods of Ex	plain the methods of				
production		oduction of alcohol from	L		V *	
from local r	-	cal raw materials e.g.:				
materials e.		• Corn				
• Corn		• Cocoyam				
• Cocoyam		• Banana				
• Banana		• Sugar-cane, etc.				
• Sugar-can	e, etc.	-	Y			
8.11 State the v		plain the various uses	`			
of alcohol a		alcohol and ethanol				
		ind the concepts of chem		1		
9.1 Define che		xplain chemical	Textbooks			
reaction	rea	action	Journals			
			Whiteboard			
9.2 List differe		xplain different types of				
chemical re	eaction ch	emical reaction	Computer			
0.2 Explain Ca		Y	Internet Draiaatar			
9.3 Explain Ca in chemica		ed in chemical	Projector Slides.			
III Chemica		actions	Silues.			
C C		actions				

9.4 Give examples of	Give examples of			
different types of reaction mentioned in 9.2 above	different types of reaction mentioned in 9.2 above		NCr'	
9.5 Define rate of chemical reaction	Explain rate of chemical reaction			
9.6 Explain factors affecting rates of chemical reactions	Explain factors affecting rates of chemical reactions	AIC	, t	
9.7 Outline some chemical reaction that has beneficial industrial applications	Outline some chemical reaction that has beneficial industrial applications	TECT		
VALUATION /A:60% XAMS: 40% OTAL: 100%	RD FO			
AAILONA	BOR			
107th				

		CONTACT HOURS: 2		
YEAR: I SEMESTER: 0	CREDIT UNIT: 3 PRE-REQUISITE:	THEORETICAL: 2 PRACTICAL: 1		
GOAL : This module is designed to introduce the stu				
which they live	6			
GENERAL OBJECTIVES: On completion of this	course, the student should be able to:			
		7		
1.0 Understand the concept of living things				
2.0 Know the structure of cells				
3.0 Understand the principal features of different gro				
$4.0~\mathrm{Know}$ the methods by which plants and animals	feed themselves			
5.0 Understand the methods by which organisms gen				
6.0 Know the methods by which substances are mov	ed in the bodies of plants and animals			
7.0 Understand how plants and animals remove their	waste products			
8.0 Understand how living things move				
9.0 Know how living things increase in size and num	nber (
10.0 Understand the interaction between an organism	n and its environment			
11.0 Know man's interference with his environment				
12.0 Understand the fundamentals of inheritance				
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AALONALBOA				

AMME: NATIONAL DIPLO		CODE. CTD 101		CONT	ACT HOUDS. 2	
LIIILE: General Biology I				^		
CEMESTED. 0						
	-			rkAe	IICAL: 1	
			as and to make th	om undore	tand the anyiron	pont in which
ins module is designed to muc	buttle the students to basis	e biological scient	ces and to make in	enn unders		nent in which
AL OBJECTIVE: 1.0 Underst	and the concept of living	things				
RETICAL CONTENT	1 0	0	PRACTICAL C	ONTEN	Г	
SPECIFIC LEARNING	TEACHER'S	RESOURCES	SPECIFIC LEA	RNING	TEACHER'S	RESOURCE
OUTCOME	ACTIVITIES				ACTIVITIES	
1.1 Explain Living Things	Explain living things	Textbooks	×			
		Journals				
1.2 Define Biology	Explain Biology					
		riojecioi				
1.4 Explain characteristics of	Explain the					
-						
NIGER D or	organisms					
MARRIAGE'D)						
-	-					
-	-					
	Mango tree plant,					
	 This module is designed to intro AL OBJECTIVE: 1.0 Underst ETICAL CONTENT SPECIFIC LEARNING OUTCOME 1.1 Explain Living Things 1.2 Define Biology 1.3 Explain living things and non-living things 1.4 Explain characteristics of living things (e.g., MR NIGER D or MARRIAGE'D) 1.5 Explain the differences between a plant, an animal and a protest e.g.: 	CREDIT U SEMESTER: 0 PRE-REQUE SPECIFICATION: THEORETICAL AND PRACTI 'his module is designed to introduce the students to basis Introduce the students to basis AL OBJECTIVE: 1.0 Understand the concept of living TICAL CONTENT SPECIFIC LEARNING OUTCOME TEACHER'S ACTIVITIES 1.1 Explain Living Things Explain living things 1.2 Define Biology Explain living things 1.3 Explain living things and non-living things Explain living and nof- living things (e.g., MR NIGER D or MARRIAGE'D) 1.5 Explain the differences between a plant an animal and a promet e.g.: Explain the differences between a plant an animal and a promet e.g.:	CREDIT UNIT: 3 CREDIT UNIT: 3 SEMESTER: 0 PRE-REQUISITE: CSPECIFICATION: THEORETICAL AND PRACTICAL his module is designed to introduce the students to basic biological scient AL OBJECTIVE: 1.0 Understand the concept of living things ETICAL CONTENT SPECIFIC LEARNING OUTCOME TEACHER'S ACTIVITIES RESOURCES 1.1 Explain Living Things Explain living things Textbooks Journals 1.2 Define Biology Explain Biology Whiteboard Varker 1.3 Explain living things and non-living things Explain living and non-living things of Explain living and non-living things Fexplain living and non-living things of Explain living and non-living things of Explain living things in the immediate environment Projector 1.4 Explain characteristics of Explain the characteristics of living organisms Characteristics of living organisms Projector 1.5 Explain the differences between a plant, an animal and a provist e.g.: Explain the differences between a plant, an animal and a provist e.g.: Explain animal and a provist e.g.:	CREDIT UNIT: 3 SEMESTER: 0 PRE-REQUISITE: SPECIFICATION: THEORETICAL AND PRACTICAL his module is designed to introduce the students to basic biological sciences and to make the students to basic biological sciences between a plant, an animal and a protist e.g.:	CREDIT UNIT: 3 THEO SEMESTER: 0 PRE-REQUISITE: FRAME SPECIFICATION: THEORETICAL AND PRACTICAL his module is designed to introduce the students to basic biological sciences and to make them unders LOBJECTIVE: 1.0 Understand the concept of living things ETICAL CONTENT SPECIFIC LEARNING OUTCOME TEXPLOY I.1 Explain Living Things L.2 Define Biology Laplain living things Lexplain living things 1.2 Define Biology Laplain living things Lexplain living and not- living things I.2 Define Biology Laplain living and not- living things Internet immediate environment Projector 1.4 Explain characteristics of living things (e.g., MR NIGER D or MARRIAGE'D) Laplain the differences between a plant, an animal and a protist e.g.:	CREDIT UNIT: 3 THEORSTICAL: 2 SEMESTER: 0 PRE-REQUISITE: PRATICAL: 1 SPECIFICATION: THEORETICAL AND PRACTICAL 1

	mycobacterium	mycobacterium				
	tuberculosis for protist	tuberculosis for protist			$C X^{*}$	
	and man for animal)	and man for animal)				
NEF	RAL OBJECTIVE 2.0: Know t	he structure of cells				
	2.1 Discuss History and	Discuss History and	Text books		Guide students to:	Microscope
	Discovery of Cell	Discovery of Cell	Journals	Observes some cells under	Observes some	
			Whiteboard	the microscope (e.g. a	cells under the	Magnifying
	2.2 Explain a Cell theory	Explain a cell theory	Marker	plant cell, and animal cell)	microscope (e.g. a	glass
			Computer		plant cell, and	
	2.3 Define Cell	Explain Cell	Internet		animal cell)	Prepared slide
			Projector			
	2.4 Different types of Cell	Distinguish between		Draw and label the cells	Draw and label the	
	(Eukaryotic &	prokaryotic and		observed in above practical	cells observed in	
	Procaryotic)	eukaryotic cells	Y		above practical	
	2.5 Differentiate between an	Differentiate between	8-			
	animal cell and a plant cell	plant and animal cell,				
	2.6 List the components/Cell	Explain the components/				
	Organelles (Structure)	Cell Organelles				
		(Structure)				
	2.7 Explain the function of	Explain the functions of				
	cell organelles (Structure)	the different cell				
		organelles				
	2.8 Explain cell Division	Explain cell Division				

cell divisioncell division2.10Differentiate between Mitosis and Meiosis cell divisionDifferentiate between Mitosis and Meiosis cell division2.11Explain Mitotic cellExplain Mitotic cell	1		
between Mitosis and Meiosis cell division Mitosis and Meiosis cell division	1		
Meiosis cell division division	1		\mathbf{O}
2.11 Explain Mitotic cell Explain Mitotic cell			
$\mathbf{L}_{\mathbf{L}}$			
division and Meiotic division and Meiotic			
Cell Division Cell Division			
Diagrammatically Diagrammatically			
		\mathcal{Y}	
2.12 Explain the Explain the differences between between mitosis and		7	
mitosis and meiosis cell meiosis cell division	` ` ∕		
division			
2.13 List the importance Explain the importance	\mathbf{y}		
of cell division of cell division			
L OBJECTIVE 3.0: Understand the principal features	s of different groups	os of living things	
ALIONALBOAL			

 3.1 Explain Major divisions of the Plant Kingdom: Thallophyta Bryophyta Pteridophyta Spermatophyta (indicate the features of a subgroup called angiosperm and gymnosperm) 	divisions under the plant Jo kingdom: W • Thallophyta M • Bryophyta C • Pteridophyta In	ext books ournals Thiteboard farker omputer ternet rojector	JCA
3.2 State the characteristic features of each division in 3.1 above	Explain the characteristic features of each division in 3.1 above		
3.3 List the differences between algae and fungi	Explain the differences between algae and fungi		
3.4 List two examples of each group in 3.3 above	Explain two examples of each group in 3.3 above		
3.5 Explain the features of Flowering Plant	Explain the external structures of a flowering plant		

3.6 Explain types of flower i.e., insect pollinated	Explain types of flower i.e., insect pollinated					
flower and wind pollinated flower based	flower and wind pollinated flower based					
on the structural	on the structural					
differences	differences		, ,			
3.7 Describe the external	Describe the external					
structures of a flowering	structures of a flowering					
plant	plant					
3.8 Explain Animal Kingdom	n Explain Animal		\mathbf{N}			
	Kingdom		>			
3.9 Explain the two (2) group	Explain the two (2)					
of the animal kingdom	group of the animal	2 '				
i.e., the invertebrate	kingdom i.e., the					
animal and vertebrate animal each with	invertebrate animal and vertebrate animal each					
examples and features	with examples and					
differentiating them.	features differentiating					
	them.					
3.10 List the different phyla	Explain the different					
under animal kingdom	phyla under animal					
	kingdom					
3.11 Explain the	Explain the					
distinguishing >	distinguishing					
	characteristics of each phylum mentioned in	characteristics of each phylum mentioned in 3.6				
----	--	--	-----------------------	---------------------------	-------------------------	---------
	3.10					
	3.12 State two common	Explain two common				
	examples of animals belonging to each group	examples of animals belonging to each group				
	3.13 Describe the external	Explain the external				
	structure of a mammal	structure of a mammal				
ER	AL OBJECTIVE 4.0: Know the		ts and animals fe	ed themselves (Nutrition)		
7	4.1 Explain Plant and Animal	, 1	Text books		Guide students to: []	Jiagram
	Nutrition	Animal Nutrition	Journals	Draw and label the	Draw and label the	C
	4.2 Distinguish between the	Distinguish between the	Whiteboard Marker	digestive system in man	digestive system in man	
	food of plants and that of		Computer			
	animals	animals	Internet Projector			
	4.3 Distinguish between	Distinguish between				
	autotrophic and	autotrophic and				
	heterotrophic modes of	heterotrophic modes of				
	feeding	feeding				
		Explain with examples				
	the different types of	the different types of				
	heterotrophies e.g.	heterotrophies e.g.				
	parasitism and	parasitism and				
	saprophytism	saprophytism.				
	<u> </u>					

	4.5 Explain the different	Explain the different				
	types of autotrophy e.g.	types of autotrophy e.g.				
	• Photosynthesis,	• Photosynthesis,				
	• Chemosynthesis.	• Chemosynthesis.				
	4.6 Explain Animal	Explain Animal				
	Nutrition	Nutrition				
	4.7 Explain Balanced diet	Explain Balanced diet			, 	
	and its composition	and its composition				
	4.8 List the stages involved	Explain the stages				
	in feeding animals, e.g.:	involved in feeding		*		
	• Ingestion	animals e.g.:				
	• Digestion	• Ingestion				
	Assimilation and	Digestion				
	• Egestion.	Assimilation and				
		• Egestion.	γ			
ERA	AL OBJECTIVE 5.0: Unders	tand the methods by which	n organisms gene	rate energy from	their food	
	5.1 Define respiration	Explain respiration	Text books			
			Journals			
	5.2 Distinguish between	Explain the differences	Whiteboard			
	respiration and breathing	between respiration and	Marker			
		breathing	Computer			
	🔨	Y	Internet			
	5.3 Differentiate between	Explain the differences	Projector			
	aerobic and anaerobic	between aerobic and				
	respiration.	anaerobic respiration				

	5.4 Explain sites of respiration in cells (e.g. mitochondrion and free	Explain sites of respiration in cells (e.g. mitochondrion and free			CA	
	cytoplasm)	cytoplasm)			D^{-}	
	5.5 State the economic	Explain the economic				
	importance of fermentation (Production	importance of fermentation Production				
	of alcoholic beverages,	of alcoholic beverages,				
	lactic acid, vinegar,	lactic acid, vinegar,				
	bread, garri and	bread, garri and				
	condiment production.)	condiment production.)				
	5.6 List the respiratory	Explain the respiratory				
	organs in animals (e.g.	organs in animals (e.g.				
	plasma membrane in	plasma membrane in				
	protozoa, tracheal system					
	in arthropods, gills in fish					
	and lungs in terrestrial animals)	gills in fish and lungs in terrestrial animals				
NE	RAL OBJECTIVE 6.0: Know the		stances are moved	d in the bodies of plants and	animals	
		Explain the following:	Textbooks	1		Perfume
	Osmosis	• Osmosis	Journals	Demonstrate osmosis and	Demonstrate	
	Diffusion	Diffusion	Whiteboard	diffusion by simple	osmosis and	Potato
	Plasmolysis	• Plasmolysis	Marker	experiments.	diffusion by	
			Computer		simple	1000ml beake
	6.2 Define transpiration	Explain transpiration	Internet		experiments.	salt
			Projector			

	6.3 Explain the importance of	Explain the importance		Draw and label the	Draw and label the	
	transpiration in living	of transpiration in living		structure of a mammalian	structure of a	
	organisms	organisms		heart.	mammalian heart.	
	6.4 Explain the importance of	Explain the importance				
	translocation	of translocation				
	6.5 Explain Vascular System	Explain the vascular				
		system of the plant				
	6.6 Differentiate between	Differentiate between				
	Vascular system of Dicot	Vascular system of		\mathbf{N}		
	and Monocot Plants	Dicot and Monocot				
		Plants				
	6.7 Explain the Structure and	Explain the structure and				
	_	function of blood in				
	higher animals	higher animals) ^r			
	6.8 Describe clotting of blood	Describe clotting of				
		blood				
ļ	AL OBJECTIVE 7.0: Underst		als remove their w	vaste products		
		Explain Excretion and	Textbooks			
	give examples	give examples	Journals			
	A .	\mathbf{Y}	Whiteboard			
		Explain excretory organs				
	organs and excretory	and excretory products	Computer			
	products in man		Internet			
	× ×		Projector			

	7.3 List the structures	Explain the structures				
	involved in excretion and	_			c	
		and the excretory				
	plants	products in plants				
	7.4 Explain the processes of	Explain the processes of				
	and various types of	plants and various types			>	
	animals	of animals				
	RAL OBJECTIVE 8.0: Underst					
11	8.1 Explain the organs of	Explain the organs of	Textbooks			
	locomotion in animals	locomotion in animals	Journals			
	(e.g. pseudopodia: cilia,	(e.g. pseudopodia: cilia,	Whiteboard	*		
	chaetae, jointed limbs	chaetae, jointed limbs	Marker			
	etc.)	etc.)	Computer			
			Internet			
	8.2 Explain general plan of	Explain the general plan	Projector			
	the Skeletal System in	of the skeleton in				
	mammals (axial skeleton	mammals (axial				
	and appendicular	skeleton and				
	skeleton)	appendicular skeleton)				
	8.3 Explain types of skeleton	Explain types of				
	i.e., chitinous exoskeletor					
	in insects and	exoskeleton in insects				
	endoskeleton in	and endoskeleton in				
	mammals.	mammals.				
			1	1	I	

	8.4 State the functions of the skeleton in higher animals	Explain the functions of the skeleton in higher animals			JCA .	
	8.5 List the different types of movements in plants (e.g. tropism's taxisms, nastic movements e.t.c)	types of movements in		CALEN		
	RAL OBJECTIVE 9.0: Know h			er	I	
2	9.1 Explain Reproduction in living things	Explain reproduction in living things	Textbooks Journals Whiteboard			
	9.2 Distinguish between sexual, asexual and vegetative propagation	Explain the difference between sexual and asexual reproduction	Marker Computer Internet Projector			
	9.3 List some examples of asexual reproduction in plants and animals (e.g. binary fission in bacteria, budding in yeast, fragmentation in spirogyra, grafting etc.)	Explain some examples of asexual reproduction in plants and animals (e.g. bihary fission in bacteria, budding in yeast, fragmentation in spirogyra, grafting etc.)				
	9.4 List the advantages of asexual and sexual	Explain the advantages of asexual and sexual				

	reproduction in plants and					, , ,
	animals	and animals				
9.5	Discuss the modern	Explain the modern			$\hat{\mathbf{A}}$	
	advances in plants	advances in plants				
	cultures and in invitro	cultures and in invitro			\mathbf{V}'	
	and in vivo fertilization	and in vivo fertilization				
	(e.g. test tube babies and	(e.g. test tube babies and				
	artificial insemination	artificial insemination				
	respectively).	respectively).				
9.6	Describe methods of	Explain methods of				
	measuring growth in	measuring growth in				
	living things	living things				
RAL	OBJECTIVE 10.0: Under	stand the interaction betw	een an organism	and its environment		
10.	1 Define the following	Explain the following	Textbooks			
	terms	terms:	Journals			
	• Ecology (autecology	Ecology	Whiteboard			
	and synecology)	(autecology and	Marker			
	• Habitat (terrestrial	synecology)	Computer			
	and aquatic [lotic and	• Habitat	Internet			
	lentic])	(terrestrial and	Projector			
	• Community	aquatic [lotic and				
	Population	lentic])				
	🔺 .	✓ Community				
		• population				
10.	2 Explain the interaction	Explain the interaction				
	of living things as	of living things as shown				

shown by predation, parasitism,	by predation, parasitism, saprophytism,				
saprophytism, commensalism, scavenging	commensalism			30.	
10.3 List examples of	Explain examples of				
interactions in 10.2 above	interactions in 10.2 above		1 CAr		
10.4 Explain the food	Explain the food				
relationship in the	relationship in the				
community (e.g. food	community (e.g. food		·		
	chain, food web,				
of numbers, pyramid of	pyramid of numbers				
energy etc.)	etc.)				
10.5 List useful and harmful	Explain useful and	>			
microbes giving	harmful microbes giving				
10.6 State the causes and	Explain the causes and				
control of the following	control of the following				
diseases	diseases				
• Malaria	Malaria				
Guinea worm	Guinea worm				
• Bilharzia	Bilharzia				
River blindness	River blindness				
• Cholera	Cholera				
• Meningitis	Meningitis				

	• Typhoid fever	• Typhoid fever				
	10.7 State the common	Explain the common				
		sources of				
	environmental pollution.	environmental pollution.				
	10.8 Explain the types of	Explain the types of				
	environmental pollutants	environmental pollutants				
	(biodegradable and non-	(biodegradable and non-				
	biodegradable	biodegradable pollutants)				
	pollutants)					
	10.9 Describe the effects of	Explain the effects of				
	environmental pollution	environmental pollution				
	on living organisms	on living organisms	Y			
	10.10 List the control	Explain the control				
	measures of	measures of	`			
	environmental pollution		ſ			
	_	described in 10.9 above				
R	AL OBJECTIVE 11.0: Unders		vith his environm	ient		
	11.1 Explain Types of soil	Explain Types of soil	Textbooks			
			Journals			
	11.2 Explain the	Explain the composition	Whiteboard			
	composition and		Marker			
	characteristics of a	fertile soil	Computer			
	fertile soil		Internet			
			Projector			
	× ×					

11.3 List the causes of soil	Explain the causes of			
erosion	soil erosion			
11.4 Give three methods of	Explain three methods of			
prevention of soil	prevention of soil		\mathbf{N}	
erosion	erosion			
11.5 Describe man's	Explain man's activities			
activities (Farming,	(Farming, Mining,			
Mining, Deforestation,	Deforestation,			
overgrazing that	overgrazing that			
accentuate disasters e.g.	accentuate disasters e.g.			
desert encroachment,	desert encroachment,			
flooding etc.	flooding etc.	$\mathbf{\hat{v}}$		
11.6 Enumerate different	Explain different	×		
methods by which the	methods by which the			
deleterious effects can	deleterious effects can			
be minimized	be minimized			
11.7 Explain the need for the				
creation of dams and	creation of dams and			
lakes	Takes			
11.8 List the disadvantages of	Explain the			
man-made lakes	disadvantages of man-			
	made lakes			

	_	Explain the role of	Textbooks			
		chromosomes and genes				
	found in the nucleus of	found in the nucleus of	Whiteboard		\sim	
	the cell	the cell	Marker		\mathbf{X}	
			Computer		$\mathbf{\mathbf{v}}$	
	12.2 Explain the role of	Explain the role of	Internet			
	gametes in cross	gametes in cross	Projector			
	fertilization	fertilization				
	12.3 Define hybridization,	Explain hybridization,				
	phenotypes and	phenotypes and		\mathbf{N}		
	genotypes	genotypes		*		
	12.4 Explain the ABO blood	Explain the ABO blood				
	groupings	groupings				
	125 Dec. 1 1					
	12.5 Describe how sex is	Explain how sex is	1			
	determined in man	determined in man				
	12.6 Explain sex-linked	Explain sex-linked				
	characters (e.g.	characters (e.g.				
	haemophilia)	haemophilia)				
EVA	ALUATION:		1	1	I	
Ľ.A	.: 60%	$\mathbf{\nabla}$				
٢ <i>i</i>	AMINATION: 40%					
)]	ГАL: 100%					

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DAL : This course is	IVES : On completion of	CREDIT UNIT: 3 PRE-REQUISITE: dents with the knowledge and skills of this course, the student should be able	
ENERAL OBJECT Understand units a	IVES : On completion of		
Understand units a	-	this course, the student should be able	to:
Understand the me Understand friction Know the concept Know the general of Know the nature of	concept of static electricit current electricity of heat and temperature tion and refraction	ds and solids	`

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	AMME: HIGHER NATIO				-		
COURS	E TITLE: General Physics II	COURSE C	ODE : STP 301		CONTAC	CT HOURS: 3	
		CREDIT UI	NIT: 3		THEORE	TICAL: 2	
YEAR:	I SEMESTER: 0	PRE-REQU	ISITE:		PRACH	CAL: 1	
COURS	E SPECIFICATION: THEO	DRETICAL AND PRAC	TICAL	4			
GOAL:	This course is designed to acq	uaint students with the k	nowledge of core	concepts in class	sical physic	s.	
GENER	AL OBJECTIVE 1.0: Under	stand units and dimensio	ons	c x			
THEO	RETICAL CONTENT			PRACTICAL		Γ	
WEEK	SPECIFIC LEARNING	TEACHER'S	RESOURCES	SPECIFIC LE	ARNING	TEACHER'S	RESOURCES
	OUTCOME	ACTIVITIES		OUTCOME		ACTIVITIES	
1-2	1.1 Define units and	Explain units and	Textbooks				
	dimensions	dimensions	Journals	,			
			Whiteboard				
	1.2 Differentiate between	Differentiate between	Marker				
	fundamental and derived		Computer				
	units	derived units	Internet Projector				
	1.3 Give examples of both	Explain examples of	FIOJECIOI				
	derived and fundamental	both derived and					
	units	fundamental units					
	1.4 Explain how to check the	Explain how to check					
	correctness of equations	the correctness of					
	like:	equations like					
	V2 = u2 + 2as; V = U +	v2 = u2 + 2as; V =					
	at; $T = 2\pi \sqrt{L}$ Getc.	U + at; T = $2\pi\sqrt{L}/$					
	usingdimensions	Getc. using dimensions					

;	2.1 Define vectors and	Explain vectors and	Textbooks			
	scalars	scalars	Journals			
			Whiteboard		\mathbf{N}	
	2.2 Explain examples of	Explain examples of	Marker			
	both scalars and vectors	both scalars and	Computer	\sim		
	quantities	vectors quantities	Internet			
	1	1	Projector			
	2.3 Explain how to solve	Explain how to solve				
	simple problems	simple problems				
	involving scalars and	involving scalars and				
	vectors	vectors				
ener	al Objective 3.0: Know what is	meant by rectilinear mo	tion.			
-5	3.1 Explain velocity and	Explain velocity and	Textbooks		Guide student to:	
	speed	speed	Journals	Perform simple	Perform simple	
			Whiteboard	experiments to measure	experiments to	Speedomete
	3.2 Differentiate between	Explain between	Marker	velocity and speed	measure velocity	
	velocity and speed	velocity and speed	Computer		and speed	
			Internet			
		Explain the equations	Projector	Solve problems using	Solve problems	
	uniform motion in a	of uniform motion in a		equations derived in 3.2	using equations	
	straight line by graphical			above	derived in 3.2 above	
	method	graphical method				
				Solve simple problems on	Solve simple	
	3.4 Explain how to solve	Explain how to solve		motions	problems on	
	problems using equations				motions	
	derived in 3.3 above	equations derived in				
		3.3 above				

3.5 State Newton's law of	Explain Newton's law			
motion	of motion			
3.6 Derive the relation	Derive the relation			
between forces, mass and				
acceleration. i.e.	and acceleration. i.e.			
F=ma where	F=ma where			
F=force	F=force			
a= acceleration=mass	a= acceleration=mass			
3.7 Define force, mass and	Explain force, mass			
weight	and weight	ć		
3.8 Explain how to solve	Explain how to solve			
simple problems using	simple problems using			
equation derived in 3.6	equation derived in 3.6			
above.	above.	×		
AL OBJECTIVE 4.0: Unde	erstand the meaning of wo	ork, energy and p	bower	
4.1 Define work, energy and	Explain work, energy	Textbooks		
power	and power	Journals		
		Whiteboard		
4.2 List types of energy	Explain types of energy	Marker		
		Computer		
4.3 Explain the law of	Explain the law of	Internet		
conservation of energy	conservation of energy	Projector		
and give examples	and give examples			

	4.4 Explain the conservation of kinetic energy and potential energy	conservation of kinetic energy and potential			
	4.5 Explain how to solve simple problems on work, energy and power	energy Explain how to solve simple problems on work, energy and power		CALE	
ENF	ERAL OBJECTIVE 5.0: Under	rstand friction as it occur	s both in liquids	and solids	
	5.1 Define friction	Explain friction	Textbooks		
	5.2 Explain types of friction	Explain types of friction	Journals Whiteboard Marker		
	5.3 Differentiate between static and dynamic friction	Explain the difference between static and dynamic friction	Computer Internet		
	5.4 Explain the applications of friction to human existence	Explain the applications of friction to human	Projector		
	5.5 Explain the effects of friction to human existence	Explain the effects of friction to human existence			

	5.6 Describe methods of reducing friction	Explain simple methods of reducing friction				
GENEF	AL OBJECTIVE 6.0: Know				\mathbf{b}	
8-9	6.1 Define the following:	Explain the following:	Textbooks	Conduct simple	Guide students to:	Elastic band
	• Elasticity,	• Elasticity,	Journals	experiments on the	Conduct simple	
	• Stress,	• Stress,	Whiteboard	following:	experiments on the	
	• Strain	• Strain	Marker	• Elasticity,	following:	
	Elastic limit	• Elastic limit	Computer	Stress	• Elasticity,	
			Internet	Strain	• Stress	
	6.2 State the relationship	Explain the	Projector	Elastic limit	• Strain	
	between load and	relationship between	خ ا	XY	• Elastic	
	extension	load and extension			limit	
	6.3 Estimate elastic energy	Estimate elastic energy		Demonstrate the	Demonstrate the	
	from work done on	from work done on		application of elasticity in	application of	
	elasticity body	elasticity body		day-to-day life.	elasticity in day-to- day life.	
	6.4 Give practical examples	Explain the practical			duy me.	
	of application of	application of elasticity				
	elasticity in day-to-day	in day-to-day life.				
	life.					
	RAL OBJECTIVE 7.0: Know			and magnetisms	1	1
10-11	7.1 Define static electricity	1 7	Text books		Guide student to :	Goldleaf
		electricity	Journals	Use the goldleaf	Use the goldleaf	electroscope
			Whiteboard	electroscope to determine	electroscope to	
	7.2 Explain the processes of	Explain the processes	Marker	the nature of charges on	determine the	Rubber balloor
	charging by friction, and		Computer	different bodies.	nature of charges	
	conduction	and conduction	Internet		on different bodies	Glass rod

			Projector			
	7.3 Explain the working	Explain the working		Perform some laboratory	Perform come	Metal sphere
	principles of van de	principles of van de		activities to generate some		1
	Greaf generator	Greaf generator		static electricity such as:	to generate some	
				Rubber balloon and	static electricity	
	7.4 Define Magnets	Explain Magnets		glass rod	such as:	
				experiments)	Rubber balloon	
	7.5 Explain the	Explain the		Metal sphere	and glass rod	
	classifications of	classifications of		experiment etc.	experiments	
	magnets	magnets			• Metal sphere	
					experiment etc.	
	7.6 Describe how magnets	Explain how magnets		XY .		
	are made	are made				
	7.7 Explain the application	Explain the application				
	of magnets in daily life	of magnets in daily life				
NE	RAL OBJECTIVE 8.0: Know	_				
2	8.1 Define electric current	Explain electric current			Guide student to:	Light bulb
			Journals	Conduct simple	Conduct simple	0
	8.2 Explain the units of	Explain the units of	Whiteboard	experiments in electricity	-	Resistor
	electric current	electric current	Marker	such as:	electricity such as:	
			Computer	• Light bulb	Light bulb	Circuit
	8.3 State and express Ohm's	State and express	Internet	experiment	experiment	
	Law mathematically.	Ohm's Law	Projector	• Resistor	• Resistor	Power Source
		mathematically.		experiment etc.	experiment	
					etc.	
	8.4 Explain the relationship	Explain the				
	between voltage (V),	relationship between				
		voltage (V), current (I)				

current (I) and resistance					
(R).	• V=IR				
• V=IR where	where				
• V=Voltage	• V=Voltag				
• I=Current	e			\mathbf{X}	
• R=Resistance	• I=Current		4	`	
	• R=Resist				
	ance		C Y		
8.5 Illustrate	Illustrate the circuit				
diagrammatically	symbols with their				
electrical circuit	names in circuit		\mathcal{O}^{\prime}		
symbols.	arrangement		*		
8.6 Explain operation of	Explain operation of				
simple electrical	simple electrical				
measuring instruments e.g. Voltmeter, Ammeter	measuring instruments) *			
etc.	Ammeter etc.				
	Ammeter etc.				
8.7 Explain how to solve	Explain how to solve				
simple problems	simple problems				
involving resistors in	involving resistors in				
series and parallel	series and parallel				
	Y				
8.8 Define electrical energy	Explain electrical				
and power	energy and power				

	8.9 Explain how to solve problems involving	Explain how to solve problems involving				
	electrical energy 8.10 Differentiate between primary and secondary cells	electrical energy Differentiate between primary and secondary cells				
	8.11 List example of both primary and secondary cells	List example of both primary and secondary cells		AICE		
	8.12 Solve simple problem involving primary cells in series and parallel circuits	Solve simple problem involving primary cells in series and parallel circuits	R			
E	RAL OBJECTIVE 9.0: Know		temperature			
	9.1 Define temperature in relation to heat and energy	Explain temperature in relation to heat and energy.	Text books Journals Whiteboard	Conduct experiments in thermometric liquids and	Guide student to: Conduct experiments in	Thermometer Thermometri
	9.2 Explain the properties of thermometric liquids.	Explain the properties of thermometric liquids.	Marker Computer Internet Projector	 thermometers such as: Thermal expansion experiment Calibration of 	thermometric liquids and thermometers such as:	liquids Water bath
	(TA)			 thermometers Thermometer comparison experiment 	• Thermal expansion experiment	Bunsen Burn Gas

9.3 Explain temperature	Explain temperature			Calibration of	
scales i.e. Kelvin and	scales i.e. Kelvin and			thermometers	
Celsius.	Celsius.			• Thermometer	
9.4 List the various types of	Explain the various			comparison experiment	
thermometers.	types of thermometers.				
9.5 Explain the working	Explain the working				
principles of the	principles of the				
thermometers listed in	thermometers listed in				
9.4 above.	9.4 above.				
9.6 Give various examples	Explain various		Y		
of the applications of the					
thermometers listed in	applications of				
9.4 above.	thermometers listed in	Y			
	9.4 above.	$\mathbf{\tilde{\mathbf{v}}}$			
9.7 Explain the modes of	Explain the modes of				
heat transfer	heat transfer				
Conduction	Conduction				
Convection	Convection				
Radiation	Radiation				
▲					
9.8 State the effect of heat	Explain the effect of				
on liquids and solids	heat on liquids and				
	solids				

9.9 Explain some	Explain some					
applications of expansion in real life situations.	expansion in real life situations.			JU SU	U ^r	
9.10 Define expansivity and	Explain expansivity					
solve simple problems	and solve simple					
using the related	problems using the					
equation	related equation					
9.11 Define heat capacity,	Explain heat capacity,					
specific heat capacity	specific heat capacity		\mathbf{N}			
and specific latent heats.	and specific latent					
	heats.					
9.12 Explain how to solve	Explain how to solve					
problems involving heat	problems involving					
capacity, specific heat	heat capacity, specific	\mathcal{D}^{\prime}				
capacity, latent heat of	heat capacity, latent					
vaporisation	heat of vaporisation					
AL OBJECTIVE 10.0: Unde						[
10.1 Define reflection and refraction	Explain reflection and	Text books				
refraction	refraction	Journals Whiteboard				
10.2 Explain how reflection	Explain how reflection					
and refraction take	and refraction take	Computer				
place on plane and	place on plane and	Internet				
curved surfaces	curved surfaces.	Projector				

	10.3 State the laws of	Explain the laws of						
	refraction and reflection.	refraction and reflection.			×			
	10.4 Explain apparent depth	Explain apparent depth						
	and total internal	and total internal			X Y			
	reflection	reflection						
	10.5 Explain the formation	Explain the formation			CR			
	of images by plane	of images by plane			\sim			
	mirror, spherical	mirror, spherical						
	mirrors and lenses	mirrors and lenses		\mathbf{N}				
NE	RAL OBJECTIVE11.0: Unde	rstand wave propagation		<u>,</u>				·
	11.1 Define wave	Explain wave	Text books			Guide	student to:	Ruler
	propagation	propagation.	Journals	Condu	ct simple	Condu	act simple	
			Whiteboard	-	ments on water wave	experi	ments on	Water
	11.2 Explain types of waves	Explain types of waves	Marker	such as	s:	waves	such as:	
			Computer	•	Wave generation,	•	Wave	Shallow Bas
	11.3 Define the following:	Explain the following:	Internet	•	Reflection and		generation,	
	• Displacement,		Projector		Refraction of	•	Reflection	Dropper
	Amplitude	• Amplitude			waves.		and	
	frequency,	irequency,					Refraction	Colours
	• Period,	• Period,					of waves	
	• Wavelength,	• Wavelength,						Measuring
	• Velocity	• Velocity						Tape
	• Phase of a wave	• Phase of a wave						

11.4 Explain how to solve simple problems	Explain how to solve simple problems		
involving	involving		
$v = f\lambda$ Where v= velocity	$v = f\lambda$ Where v= velocity		
f = frequency	f= frequency		
λ = wavelength	λ = wavelength		
11.5 Give practical applications of waves daily life.	Explain practical in applications of waves in daily life		
EXAMS: 40%			
FOTAL: 100%	BOWEDE		

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PROGRAMME: HIGHER NATIONAL DIPLO	DMA (HND)	
COURSE TITLE: General Chemistry II	COURSE CODE: STC 301	CONFACT HOURS: 3
	CREDIT UNITS: 3	THEORETICAL: 2
YEAR: I SEMESTER: 0	PRE-REQUISITE:	PRACTICAL:1
GOAL: This course is designed to equip student w	ith knowledge of fundamental chemica	l prenomena and their relevance to everyday life and
GOAL: This course is designed to equip student windustry.	ith knowledge of fundamental chemica	l phenomena and their relevance to everyday life and
industry.		
industry.		
industry. GENERAL OBJECTIVES: On completion of thi 1.0 Understand the basic structure of the atom.	is course, the students should be able to	٢
industry. GENERAL OBJECTIVES: On completion of thi 1.0 Understand the basic structure of the atom.	is course, the students should be able to	
 industry. GENERAL OBJECTIVES: On completion of this 1.0 Understand the basic structure of the atom. 2.0 Understand the different types of chemicals be 3.0 Understand the periodic table. 	is course, the students should be able to onds (their formation and properties).	٢
industry. GENERAL OBJECTIVES: On completion of thi1.0Understand the basic structure of the atom.2.0Understand the different types of chemicals be3.0Understand the periodic table.	is course, the students should be able to onds (their formation and properties).	
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industry.GENERAL OBJECTIVES: On completion of thi1.0Understand the basic structure of the atom.2.0Understand the different types of chemicals be3.0Understand the periodic table.4.0Understand the concepts of solutions and solu5.0Understand the concepts of electrolysis6.0Understand the laws governing chemical complexity	is course, the students should be able to onds (their formation and properties). ubility. bination	
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 industry. GENERAL OBJECTIVES: On completion of this 1.0 Understand the basic structure of the atom. 2.0 Understand the different types of chemicals be 3.0 Understand the periodic table. 4.0 Understand the concepts of solutions and solutions 5.0 Understand the concepts of electrolysis 6.0 Understand the laws governing chemical comit 7.0 Understand the change of matter and behaviout 8.0 Understand the rate of chemical reaction and solutions 9.0 Appreciate the usefulness of some non-metals 	is course, the students should be able to onds (their formation and properties). ubility. bination ur of gas under certain conditions. factors affecting rate of reaction. i like H ₂ ,Cl ₂ and their compounds.	
industry.GENERAL OBJECTIVES: On completion of thi1.0Understand the basic structure of the atom.2.0Understand the different types of chemicals be3.0Understand the periodic table.4.0Understand the concepts of solutions and solu5.0Understand the concepts of electrolysis6.0Understand the laws governing chemical coming7.0Understand the change of matter and behavior8.0Understand the rate of chemical reaction and	is course, the students should be able to onds (their formation and properties). ubility. bination ur of gas under certain conditions. factors affecting rate of reaction. i like H ₂ ,Cl ₂ and their compounds.	
 industry. GENERAL OBJECTIVES: On completion of this 1.0 Understand the basic structure of the atom. 2.0 Understand the different types of chemicals be 3.0 Understand the periodic table. 4.0 Understand the concepts of solutions and solutions 5.0 Understand the concepts of electrolysis 6.0 Understand the laws governing chemical comits 7.0 Understand the change of matter and behavious 8.0 Understand the rate of chemical reaction and solutions 9.0 Appreciate the usefulness of some non-metals 	is course, the students should be able to onds (their formation and properties). ubility. bination. ur of gas under certain conditions. factors affecting rate of reaction. slike H ₂ ,Cl ₂ and their compounds. e Cu,AI,Na etc. in our society.	

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	AMME: HIGHER NATION		ND) COURSE COI		CONTACT HOUI	D.C. 2
COURSE	E TITLE: General Chemistry	/ 11				
			CREDIT UNIT		THEORETICAL:	2
YEAR:	I SEMESTER: 0 E SPECIFICATION: THEO		PRE-REQUIS	ITE:	PRACTICAL:1	
GOAL: 7 industry.	This course is designed to eque	ip student with know	ledge of fundam	ental chemical phenomena ar	d their relevance to	everyday life and
	THEORETICAL CONTE	ENT		PRACTICAL CONTENT	1	
WEEK	SPECIFIC LEARNING OUTCOME	TEACHER'S ACTIVITIES	RESOURCES	SPECIFIC LEARNING OUTCOME	TEACHER'S ACTIVITIES	RESOURCES
1	1.1 Define atom.	Explain an atom	Text books			
	1.2 Explain the 3 basic constituents of the atom:	Explain the 3 basic , constituents of the	Journals Whiteboard Marker			
	• Electrons,	atom:	Charts			
	Protons	• Electrons,	Computer			
	• Neutrons.	Protons Noutrons	Internet Projector			
	1.3 Explain the arrangement	Explain the				
	of electrons in the atoms					

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the electrons, protons	Explain the properties of the electrons, protons and neutrons.				jch	
atomic mass and relative molecular mass	Explain the relative atomic mas and relative molecular mass.			ALLI		
elements that exhibit	Explain isotopes and give examples of some elements that exhibit isotopy e.g. chlorine.		CHIN			
calculate the relative atomic mass of some	Explain how to calculate the relative atomic mass of some isotopic elements.					
1.8 Explain the arrangement of electrons in the atoms.						
AL OBJECTIVE 2.0: Unders	stand the different typ		bonds (their form	ation and propert	ies).	
2.1 Define chemical bond	Explain chemical bond	Text books Journals Whiteboard				

	2.2 Outline the 3 types of	Explain the 3 types	Marker				
	chemical bonds, viz:	of chemical bonds,	Charts				
	• Covalent bond	viz:	Computer				
	 Dativebond 	• Covalent bond				\sim	
	• Electrovalent bond.	• Dative bond	Projector			\mathbf{N}	
		• Electrovalent					
		bond					
	2 2 Define valency				Cr.		
	2.3 Define valency.	Explain valency.			Y		
	2.4 List the valences of	Explain the valences					
	some common elements	of some common					
	like $H_{2,}O_{2,}$ Na and K	elements like H ₂ , O ₂ ,					
		Na and K		*			
		•					
	2.5 Outline the formation of						
	each bond type.	of each bond type.					
	2.6 Outline the properties of	Outline the	*				
	each bond type.	properties of each					
		bond type.					
E	RAL OBJECTIVE 3.0: Under						
	3.1 Define periodic table	Define periodic	Text books				
	×	table	Journals				
			Whiteboard				
	3.2 State the importance of	State the importance					
	periodic table	of periodic table	Charts				
			Computer				

3.3 Describe the periodic table.	Explain periodic table.	Internet Projector Periodic table		CA	
3.4 Explain the relative positions of elements on the table.	elements on the				
3.5 Discuss the two main division of the periodic table.	table. Explain the two main division of the periodic table.		ALA		
3.6 State the general properties of each group of elements.	Explain the general properties of each group of elements				
AL OBJECTIVE 4.0: Under 4.1Define a solution.	stand the concepts of Explain a solution.		lubility	Guide student to	Water
		Journals	Conduct some simple	Conduct some	vv alci
 4.2 Differentiate between types of solutions: Saturated Unsaturated Super –saturated 	Explain the difference types of solutions: • Saturated, • Unsaturated • Super – saturated	Whiteboard Marker Charts Computer Internet Projector	experiments of water quality (physical and chemical).	simple experiments of water quality (physical and chemical).	pH meter
4.3 Define the term solubility.	Explain the term solubility				

4.4 Explain the solubility of some compounds like KNO ₃ ,CUSO ₄ , etc. in water.	Explain the solubility of some compounds like KNO3,CUSO4, etc in water.		CDUCA.	
4.5 Explain the significance of the use of solubility curves.	Explain the significance of the use of solubility curves.			
4.6 Describe how to solve simple problems based on 4.4 and 4.5 above.	Explain how to solve simple problems based on 4.4 and 4.5 above.	C E C E L		
RAL OBJECTIVE 5.0: Under 5.1 Define electrolysis.	tand the concepts of electron Explain electrolysis. Text bo			
5.2 Define electrolytes and non-electrolytes.	Explain electrolytes Whitebo and non-electrolytes Marker Charts	5		
5.3 List examples of electrolyte and non- electrolyte	Explain examples of Compute electrolyte and non- Internet electrolyte Projecto			
5.4 Explain Faraday's law of electrolysis.	Explain Faraday's law of electrolysis.			
5.5 Explain the uses of	Explain the uses of			

electrolysis in some	electrolysis in some				
electrolytes	electrolytes				
5.6 Explain the uses of	Explain the uses of				
electrolytes.	electrolytes.			\mathbf{N}	
5.7 Derive mathematically	Explain				
the relation between	mathematically the				
current ionic charge and	=				
mass of substances	current ionic charge				
liberated electrodes.	and mass of				
	substances liberated				
	electrodes.				
5.8 Describe how to solve	Explain how to solv	e 🖍	$\mathbf{\hat{\mathbf{V}}}$		
some problems based on			1		
5.7 above.	based on 5.7 above.				
5.9 List some applications	Explain some				
of electrolysis in	applications of	>			
industry.	electrolysis in	7			
maasa y.	industry				
L OBJECTIVE 6.0: Under		ning chemical co	mbination.	 	
6.1 State the laws of:	Explain the laws	Text books			
• Conservation of	of:	Journals			
matter	• Conservation	Whiteboard			
• Gay lussac's	of matter	Marker			
 Avogadros 	• Gay lussac's	Charts			
	 Avogadros 	Computer			

	6.2 Describe how to solve	Explain how to	Internet Projector				
	simple problems involving formulae, chemical	solve simple problems involving				\mathbf{S}	
	composition and mole	formulae, chemical					
	concept.	composition and					
	· · · · · · · · · · · ·	mole concept.					
R	RAL OBJECTIVE 7.0: Under	=	natter and behavio	our of gas under	certain conditions.		
	7.1 Explain the kinetic	Explain the kinetic	Text books				
	theory of matter in	theory of matter in	Journals				
	relation to:	relation to:	Whiteboard				
	• The nature of	• The nature of	Marker	×Y-			
	solids, liquids	solids, liquids	Charts				
	and gases.	and gases.	Computer	\mathcal{O}^{-}			
	Diffusion of	• Diffusion of	Internet	*			
	gasses	gasses	Projector				
	• Melting and	• Melting and					
	boiling points.	boiling points.	\mathbf{k}				
	7.2 State the following gas	Explain the					
	laws qualitatively and	following gas laws					
	mathematically -	qualitatively and					
	Boyles, Charle's,	mathematically –					
	Graham's and Dalton's.						
		Graham's and					
		Dalton's.					
	7.3 Derive the relationship	Explain the					
	between the vapour	relationship between					

	density of a gas and its	the vapour density of	f				· ·
	relative molar mass.	a gas and its relative					
		molar mass.					
7	7.4 Describe how to solve	Explain how to				\sim	
		solve simple				\mathbf{N}	
	on 7.2 above.	problems					
		based on 7.2			\sim		
		above.					
	ERAL OBJECTIVE 8.0: U			n and factors affe	cting rate of	reaction.	
8	3.1 Differentiate between	Explain the	Text books				
	reversible and	difference between	Journals				
	irreversible reactions.	reversible and	Whiteboard	X			
		irreversible reactions					
			Charts				
8	3.2 List examples of	Explain examples of	Computer	*			
	reversible and	reversible and	Internet				
	irreversible reactions	irreversible	Projector				
	e.g. N ₂ ,O ₄ , 2NO ₂ .	reactions e.g. N ₂ ,O ₄ ,					
		2NO _{2.}	>				
		\sim					
8	3.3 Explain the term	Explain the term					
	equilibrium.	equilibrium					
0							
ð	3.4 State Le-chatelier's	Explain Le-					
	principle.	chatelier's principle.					
c	5 Outling the factors	Explain the featons					
с	3.5 Outline the factors which can change the	Explain the factors					
	rate of a reaction viz:	which can change the rate of a reaction					
	rate of a reaction wiz:	the rate of a reaction					

	temperature,	viz: temperature,					y
	concentration, surface	concentration,					
	area, catalyst and	surface area,					
	pressure.	catalyst and				\sim	
		pressure.			\sim	N	
	8.6 Explain the manufacture	Explain the			\sim		
	of ammonia from N ₂ and	manufacture of					
		ammonia from N ₂					
	illustrate the effects of	and H ₂ (Habers					
	changes in the factors	process) to illustrate					
	mentioned in 8.5 above	the effects of					
		changes in the					
		factors mentioned in					
		8.5 above		Y			
NE	RAL OBJECTIVE 9.0: Appre			als like H ₂ , CI ₂ and	nd their comp	ounds.	1
	_	Explain the	Text books				
	preparation of the	laboratory	Journals				
		preparation of the	Whiteboard				
	• $CI_2 H_{2,}$	following non-	Marker				
	• O _{2.}	metals:	Charts				
		• CI2H2	Computer				
		Op. Y	Internet				
			Projector				
	9.2 Describe the industrial	Explain the					
		industrial					
		preparation of non-					
	10.1 above.	metals mentioned in					
		10.1 above.					

	9.3 List the physical and chemical. Properties of the following non- metals: CI ₂ ,O ₂ , C, S, N ₂ .	Properties of the			DUCA	
	9.4 List the uses of the non- metals and their compounds.	Explain the uses of the non-metals and their compounds.		NCA		
GENER	RAL OBJECTIVE10.0: Appre	ciate the importance	of some metals	like Cu. Al, Na etc. in our s	ociety.	
11	10.1 Describe the methods of extracting metals from their ores.	Explain the methods of extracting metals from their ores.				
	10.2 List the properties of metals in 11.1 above.	Explain the properties of metals, in 11.1 above	Charts Computer Internet Projector			
	10.3 List the uses of the metals and their compounds.	Explain the uses of the metals and their compounds.				
General	I Objective 11.0: Appreciate th		-	n our society.		
12-13	11.1 Explain the tetrahedral arrangement of carbon bonds.		Text books Journals Whiteboard Marker Charts	Illustrate the tetrahedral arrangement of carbon bonds.	Guide students to: Illustrate the tetrahedral arrangement of carbon bonds.	Building sticks
11.2 Explain the characteristics	Explain the characteristics	Computer Internet				
--	---	----------------------	----	--		
functional group of each class of organic compound.	functional group of each class of organic compound.	Projector				
11.3 State the general formula of each class of compounds.	Explain the general formula of each class of compounds					
11.4 Explain the naming of members of each series.	Explain the naming of members of each series.	5	CH			
11.5 Describe the general method for preparing carbon compound	Explain the general method for preparing each of the compound.	FOR				
11.6 State the physical properties of the compounds.	Explain the physical properties of the compounds.					
11.7 Describe the reaction of each class of compound						

 4-15 12.1 Explain how to clean laboratory apparatus and glass wares 12.2 Explain how to clean laboratory apparatus and glass wares 12.2 Explain the effect of heat and reagent on substances. 12.3 Explain how to prepare simple laboratory solutions 12.3 Explain how to prepare simple laboratory solutions 12.3 Explain how to prepare simple laboratory solutions 12.3 Explain how to prepare simple 12.3 Explain how to prepare simple 12.3 Explain how to prepare simple 12.4 Explain how to prepare simple 12.5 Explain how to prepare simple 12.6 Explain how to prepare simple 12.7 Explain how to prepare simple 12.8 Explain how to prepare simple 12.9 Explain how to prepare simple 	JENERAL OBJECTIVE12.0: Conduct laboratory work based on the above topics. 4-15 12.1 Explain how to clean laboratory apparatus and glass wares Explain how to clean laboratory apparatus and glass Explain how to clean laboratory apparatus and glass Clean laboratory equipment's and apparatus equipment's and apparatus. PPE 12.2 Explain the effect of heat and reagent on substances. Explain how to prepare simple laboratory solutions Explain how to prepare simple laboratory solutions Dry the apparatus either in hot oven or in air. Oven 12.3. Explain how to C/A:60% EXALUATION Explain how to C/A:60% EXAMS: 40% Evaluations			1				
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I2.3. Explain how to prepare simple laboratory solutions Explain how to prepare simple laboratory solutions Observe the effects of heat and reagents on substances. Observe the effects of heat and reagents on substances. EVALUATION C/A:60% C/A:60% C/A:60% C/A:60% C/A:60%	I2.3. Explain how to prepare simple laboratory solutions Explain how to prepare simple laboratory solutions Observe the effects of heat and reagents on substances. Observe the effects of heat and reagents on substances. Observe the effects of heat and reagents on substances. EVALUATION C/A:60% EXAMS: 40% Image: Comparison of the substance of		-	-	Internet		either in hot oven or	
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prepare simple laboratory solutions prepare simple laboratory solutions on substances. EVALUATION C/A:60% Image: Construction of the substance	prepare simple laboratory solutions prepare simple laboratory solutions on substances. EVALUATION C/A:60% EXAMS: 40% Image: Compare simple compare sindecompare simple compare simple compare simple compare si					Observe the effects of heat	Observe the effects	
laboratory solutions laboratory solutions EVALUATION C/A:60% Image: Comparison of the solution of the s	laboratory solutions laboratory solutions EVALUATION C/A:60% EXAMS: 40%	12.	.3. Explain how to	Explain how to		and reagents on substances.	of heat and reagents	
EVALUATION C/A:60%	EVALUATION C/A:60% EXAMS: 40%					,	on substances.	
C/A:60%	C/A:60% EXAMS: 40%		laboratory solutions	laboratory solutions				
	TOTAL: 100%	C/A:60	UATION 0%		<u>S</u>	_1	1	1
TOTAL: 100%								

	IE: HIGHER NATIONAL DIPLO		
COURSE TIT	LE: General Biology II	COURSE CODE: STB 301	CONTACT HOURS: 4
		CREDIT UNITS: 3	THEORETICAL: 2
YEAR: I	SEMESTER: 0	PRE-REQUISITE:	PRACTICAL: 1
GOAL: This c	course is designed to equip the student	is in (non-science programmes) with the	knowledge of the fundamental aspects of
biological scie	nce.	,	
	_	course, the students should be able to:	\mathbf{N}
1.0 Understand		\sim	
	l the types of plant and animal tissues		•
	the classification of living organisms		
-	principal features of different groups i		
		the different groups of animal kingdom	
	I the structure and life history of the fe	ollowing plants and animals:-	
i) An	Alga		
ii) An	angiosperm		
iii) A p	rotozoon		
/	rertebrate		
	I the internal structure of a flowering	-	
	l the general arrangement of the intern	al organs in a mammal.	
	l methods of nutrition.)	
	tand the transport of substances in pla		
	he process and significance of respira	tion.	
	he excretory organs and products.		
	tand the general plan of the skeleton i		
	he reproductive structures in plants an		
	tand the principal sense organs and th		
	tand the relationship of organisms to t		
	tand the constituents and characteristi		
18.0 Know t	he methods of conserving soil fertility	У.	

19.0 Know the development and method of cultivation of maize.

WATTONAL BOARD FOR THOUT AND THE AND T Understand how character is inherited. 20.0

ROGR	AMME: HIGHER NATION	AL DIPLOMA				
	E TITLE: General Biology II		URSE CODE: STB 3	01 C	ONTACT HOURS: 4	
		CR	EDIT UNITS: 3	Т	HEORETICAL: 2	
EAR:	I SEMESTER: 0	PR	E-REQUISITE:		RACTICAL: 1	
COURS	E SPECIFICATION: THEO	DRETICAL AND PR	ACTICAL			
GOAL:	This course is designed to equ	ip the students in (no	n-science programmes	s) with the knowledge	of the fundamental aspe	ects of biologic
cience.						
GENER	AL OBJECTIVE 1.0: Under					
	THEORETICAL CONTE	NT		PRACTICAL CO	NTENT	
Week	Specific Learning Outcome	Teacher's Activiti	es Resources	Specific Learning Outcome	Teacher's Activities	Resources
	Outcome			Jutcome	Activities	
	1.1Explain Cell theory and	Explain cell theory a	nd its Textbooks		Guide student to	: Microscope
	its discovery	discovery	Journals	Prepare cell slides us	sing Prepare cell	
			Whiteboard	onion	slides using	Onion
	1.2 Mention some scientist	Explain some scient			onion	
	associated with cell	associated with cell				Knife
	discovery	discovery	Internet	Identify an animal c		G1: 1
	1.2 Describe the structure of		Projector	using a microscope	animal cell	Slides
	1.3 Describe the structure of a plant cell as seen under	plant cell as seen une			using a microscope	Cover slip
	a light microscope	light microscope			interoscope	cover sup
	a light interoscope	nght metoscope		Draw and label a pla	nt cell Draw and label	a Epithelium c
	1.4 Explain the structure of	Explain the structure	of an	and an animal cell	plant cell and ar	
	an animal cell.	animal cell.			animal cell	
	1.5 State the differences	Explain the difference	ces			
	between a plant cell and	between a plant cell	and			
	animal cel	animal cell				

-	rstand the different types of p				_
2.1 Defines a tissue.	Explain a tissue	Textbooks		Guide students to	
		Journals			slides
2.2 Name 4 different	Explain 4 different types of		given permanent slide	the tissues given	
types of plant	plant tissues	Marker		permanent slide	Microsco
tissues.		Computer			
		Internet			Magnifyi
2.3 State the functions of	-	Projector			lens
each of the tissue.	each of the tissue				
2.4 Distinguish between the	Distinguish between the				
different animal tissues.	different animal tissues.				
			7		
2.5 Give the names of the	Explain the names of the				
different animal tissues	different animal tissues				
2.6 List the functions of	Explain the functions of 2.5				
2.5 above.	above.				
RAL OBJECTIVE 3.0: Appre		fication of livin	g organisms.		
3.1 Explain Taxonomy	Explain taxonomy	Textbooks			
		Journals			
3.2 Explain the rules of	Explain the rules of	Whiteboard			
nomenclature	nomenclature	Marker			
		Computer			
3.3 Explain the necessity for	Explain the necessity for	Internet			
-	-	Projector			
organisms.	organisms.	-			
	-				
3.4 Explain binomial	Explain binomial				

	nomenclature:	nomenclature:					
	Features of kingdom,	Features of kingdom,					
	phylum/division,	phylum/division,					
	subphylum/subdivision,	subphylum/subdivision,				\downarrow	
	class, sub class,	class, sub class, superclass,			$\Delta \mathbf{N}$		
	superclass, order, sub	order, sub order, genus and			\mathbf{X}'		
	order, genus and species	species					
ERAI	OBJECTIVE 4.0: Know	the classification and principation	pal features of c	ifferent groups i	n the plant I	kingdom	
4.	1 List the major groups	Explain the major groups in	Textbooks			Guide student to	: Plant
	in the plant kingdom.	the plant kingdom.	Journals	Observe, draw a	and label	Observe, draw	Specime
			Whiteboard	plant specimens	5.	and label plant	
4.2	2 Describe the general	Explain the general	Marker			specimens.	Writing
	characteristic of the	characteristic of the major	Computer)	7			materials
	major groups of plants.	groups of plants.	Internet Projector				
4.	3 Classify some common	Explain some common 🔨	i Tojettoi				
	examples of plants	examples of plants					
	······································		y				
4.4	4 State three reasons for	Explain three reasons for					
	the classifications of	the classifications of plants.					
	plants.						
ERAI	OBJECTIVE 5.0: Under	stand the classification and o	distinguishing cl	naracteristics of	the differen	t groups in the an	imal kingc
	1 Discuss the different	Explain the different phyla					
	phyla in the animal	in the animal kingdom	Journals				
	kingdom	\mathbf{V}	Whiteboard				
	\sim		Marker				
5.2	2 Explain the 🔨 💎	Explain the distinguishing	Computer				
	distinguishing	characteristics of major	Internet				
	characteristics of major	groups of animals.	Projector				

groups of animals.					
	Explain some examples of				
of animals	animals	1			
ERAL OBJECTIVE 6.0: Under A protozoon, iv) A vertebrate	rstand the structure and life	history of the fol	lowing plants and anim	18:-1) An Alga, 11) A	n angiosp
6.1 Explain the structures of	Explain the structures of	Textbooks			
spirogyra	spirogyra	Journals			
spirogyra	spirogjiu	Whiteboard			
6.2 Describe the methods of	Explain the methods of	Marker			
reproduction in	reproduction in spirogyra	Computer			
spirogyra		Internet			
		Projector	, i		
6.3 Outline the differences	Explain the differences				
between a dicot and a	between a dicot and a				
monocot plant in	monocot plant in external				
external features	features				
6.4 Explain the methods of	Explain the methods of				
	reproduction in amoeba.				
NERAL OBJECTIVE 7.0: Under	stand the internal structure of	of a flowering pla	ant		
7.1 Explain the internal	Explain the internal	Textbooks			
structure of:	structure of :	Journals			
Root (Dicot and	Root	Whiteboard			
Monocot)	Y ● Stem in a	Marker			
• Stem (Dicot and	flowering plant	Computer			
Monocot)		Internet			
		Projector			
7.2 List types of tissues in the	Explain types of tissues in				

cross section of a	stem the cross section of	a stem		
LAL OBJECTIVE 8.0): Understand the general arra	angement of the internal of	organs in a mammal.	
8.1 List Internal organ				\mathbf{v}
Mammal		Journals	\sim	
		Whiteboard		
	s of the Explain the function			
different organs in				
above	above	Internet		
		Projector		
1): Understand the different m			1 1
9.1 Explain Nutrition	_		*	
plant and Anima	l and Animal	Journals		
9.2 Explain the diffe	erent Explain the differen	Whiteboard t Marker		
methods of nutrit	_			
methods of num		Internet		
9.3 List the macro and	d micro Explain the macro			
elements necessar				
plants	in plants	y ,		
1				
9.4 Define photosyntl	hesis Explain photosynthe	esis		
9.5 Explain the condi	itions Explain the condition	ons		
necessary for	necessary for			
photosynthesis	photosynthesis			
9.6 Describe the proc	ess of Explain the process	of		
photosynthesis	photosynthesis			

9.7 Define digestion	Explain digestion				
9.8 Explain types of Foods:	Explain the food substance				
 Energy giving food 	-	-5			
	• Energy giving food				
Body building food	Body building food				
• Health preserving	• Health preserving				
food	food				
Balanced diet	Balanced diet				
9.9 State the functions	Explain the functions of				
of the liver in body	the liver in body				
metabolism	metabolism				
RAL OBJECTIVE 10.0: Und	erstand the transport of subs	stances in plants	and animals.		1
10.1 Define the following:	Explain, the following:	Textbooks		Guide student to:	Potato
Osmosis	Osmosis	Journals	Conduct an experiment to	Conduct an	
Diffusion	Diffusion	Whiteboard	demonstrate osmosis in	experiment to	Salt
		Marker	potato cells	demonstrate	
10.2 Outline the significance	Explain the significance of	Computer		osmosis in	1000m
of these processes in	these processes in plants	Internet		potato cells	beakers
plants		Projector			
			Conduct an experiment to	Conduct an	
10.3 Explain transpiration	Explain transpiration		demonstrate diffusion	experiment to	
				demonstrate	
10.4 Explain the structure of	Explain the structure of				
blood 🖌	blood				
			Compare osmosis and	Compare	
10.5 List the functions of	Explain the structure of		diffusion	osmosis and	
blood	blood			diffusion	

AL OBJECTIVE 11.0: Under 11.1 List the respiratory	Explain the respiratory	Cance of respiration.	
organs	organs	Journals	
orguns	organs	Whiteboard	
11.2 Outline the process of	Explain the process of	Marker	
respiration and its	respiration and its	Computer	
significance	significance	internet	
6		Projector	
11.3 Explain the significance	Explain the significance of		
of 11.2 above	11.2 above		
11.4 Differentiate between	Differentiate between		
aerobic and anaerobic	aerobic and anaerobic		
respiration	respiration		
		⟨ ヽ ^y	
11.5 Explain the economic	Explain the economic		
importance of	importance of fermentation		
fermentation			
AL OBJECTIVE 12.0: Under			
12.1 Define Excretion	Explain excretion	Textbooks	
10.0 0 11 1		ournals	
12.2 Describe the excretory	Explain the excretory	Whiteboard	
organs in a mammal	organs in a mammal	Marker	
12.2 List the superstant		Computer	
12.3 List the excretory organs and excretory	Explain the excretory	nternet	
products in man	organs and excretory products in man	Projector	
12.4 State the excretory	Explain the excretory		
products in a plant	products in a plant		
	products in a plain		

	lerstand the general plan of t		mammal		T
	In Explain the general plan of			Guide students	
of Skeleton	the skeleton in a mammal	Journals		to:	
		Whiteboard	Draw and label the	Draw and label	
13.2 Explain types of	Explain types of skeleton	Marker	structure of a vertebra e.g	the structure of a	
skeleton in animals	in animals (exoskeleton	Computer	a. Atlas b. Axis	vertebra e.g. a.	
(exoskeleton and	and endoskeleton	Internet		Atlas b. Axis	
endoskeleton)		Projector			
13.3 State the functions	Explain the functions				
of the skeleton	of the skeleton				
			$\mathbf{\lambda}$		
13.4 Describe the general	Explain the general plan of	f			
_	a the skeleton in a mammal				
mammal					
		`			
13.5 Describe the skeleton	Explain the skeleton of the				
of the fore and hind	fore and hind limbs of a				
limbs of a mammal	mammal				
AL OBJECTIVE 14.0: Kno		es in plants and a	nimals.		
14.1 Explain Structure of a	Explain the structure of a	Textbooks		Guide students	Drawing
flower	flower	Journals		to:	materia
		Whiteboard	Draw and Label the	Draw and Label	
14.2 Differentiate insect and	Differentiate insect and	Marker	structure of a flower	the structure of a	
wind pollinated flower	wind pollinated flower	Computer		flower	
		Internet			
		Projector			
14.3 Differentiate between a	a Differentiate between a	5			
staminate and pistilate	staminate and pistilate				

flower	flower	
14.4 List the parts of a flower and their functions	Explain the parts of a flower and their functions	
14.5 Distinguish between pollination (self- pollinated flower and cross pollinated flower) and fertilization.	Explain between pollination and fertilization.	
14.6 Distinguish the process of fertilization in a flowering plant	Explain the process of fertilization in a flowering plant	
14.7 Distinguish between a grain, drupe and berry	Explain differences between grain, drupe and berry	
14.8 List the different methods of dispersal of fruits and seeds	Explain the different methods of dispersal of fruits and seeds	
14.9 Explain the structure of a seed and its germination of seed	Explain the structure of a seed and its germination of seed	
14.10 Explain dicotyledonous seed and	Explain dicotyledonous seed and	

monocotyledonous	monocotyledonous seeds				
seeds					
14.11 Explain germination	Explain germination of				
of seeds (epigeal	seeds (epigeal germination			\mathbf{N}	
germination and	and hypogeal germination)			\mathbf{v}'	
hypogeal germination)				,	
14.12 Explain factors	Explain factors affecting				
affecting germination	germination				
AL OBJECTIVE 15.0: Unde	erstand the principal sense or	gans and their f	inctions.	·	
15.1 Explain coordination	Explain coordination	Textbooks			
15.2 Name the principal	Explain the principal	Journals Whiteboard			
sense organs	sense organs	Marker			
		Computer			
15.3 State the functions of	Explain the functions of	Internet			
15.2 above	15.2 above	Projector			
15.4 Define hormones	Explain hormones				
15.5 List types of Hormones	Explain types of Hormones				
15.6 Enumerate the	Explain the functions of				
functions of hormones	hormones				
15.7 Explain the role of	Explain the role of auxins				
auxins in tropisms	in tropisms				
	m dopisms				I

					K	
		e relationship of organism		ment.		
16.1 Define the	-	Explain the following	Textbooks			
ecological t		ecological terms;	Journals			
• Ecosyst		• Ecosystem	Whiteboard		\mathbf{N}	
Commu	inity	Community	Marker			
Populat	ion	Population	Computer		\mathbf{Y}	
• Habitat		• Habitat	Internet		•	
			Projector			
16.2 List the bio		Explain the biotic and				
abiotic in a	habitat a	abiotic in a habitat				
16.3 Explain the	following	Explain the following		$\mathbf{\mathbf{v}}$		
associates:	-	associates:				
Symbio		Symbiosis				
Parasiti		Parasitism				
Comme		• Commensalism				
Saproph		Saprophytism				
• Sapropr	lytisiii	• Saprophytishi				
16.4 Describe th	e methods	Explain the methods of				
of studying		studying an ecological				
		nabitat				
quadrat)						
		Explain the causes and				
		control of diseases such as				
as malaria,		malaria, bilharzia cholera,				
	er blindness	river blindness and polio				
and polio						

and polio

10	6.6 Explain five pollutants	Explain five pollutants of			C P	
		air and water				
10	6.7 Describe the methods of	Explain the methods of				
	controlling pollution	controlling pollution				
NERA	L OBJECTIVE 17.0: Know	v the constituents and charac	eteristics of soil.			
1′	7.1 Explain soil Study	Explain soil Study	Textbooks		Guide student to:	Soil Sampl
			Journals	Examine the texture of soil	Examine the	
1′	7.2 List the constituents of	Explain the constituents of	Whiteboard	sample in the laboratory.	texture of soil	pH meter
	soil	soil	Marker		sample in the	
			Computer		laboratory.	Beaker
1′	7.3 Differentiate between	Explain the differences	Internet			
	different types of soil,	between types of soil, e.g.	Projector			
	e.g. sandy, clay, loamy.	sandy, clay, loamy.		Determine the pH of the	Determine the	
			Ĺ	soil sample	pH of the soil	
1′	7.4 Explain the	Explain the characteristics			sample	
	characteristics of a good	of a good soil most				
	soil most favourable for	favourable for crop				
	crop cultivation	cultivation				
1′	7.5 Explain how soil	Explain new soil organisms				
	organisms increase soil	increase soil fertility				
	fertility					
NERA	L OBJECTIVE 18.0: Unde	rstand the methods of conse	rving soil fertilit	y.		
1	8.1 Explain Soil	Explain Soil conservation	Textbooks			
	conservation 🔨 💎		Journals			
1	8.2 List the ways in which	Explain the ways in which	Whiteboard			
	soils lose fertility	soils lose fertility	Marker			

18.3 Define Soil Erosion	Explain Soil Erosion	Computer Internet			
8.4 List types of soil erosion.	Explain types of soil erosion.	Projector		á)	
erosion.					
18.5 State the measures to	Explain the measures to				
check soil erosion	check soil erosion				
18.6 Outline the various	Explain the various ways to				
ways to conserve soil	conserve soil fertility				
fertility			Y		
	lerstand the development and		tion of maize.		
19.1 Discuss the type of soil	Explain the type of soil	Textbooks			
preferred by maize	preferred by maize	Journals			
		Whiteboard			
19.2 Explain the method of	Explain the method of	Marker			
cultivation	cultivation	Computer			
		Internet			
19.3 Discuss major diseases	Explain major diseases	Projector			
which can affect maize		i iojectoi			
which can affect marze	which can anothinaize				
19.4 List how the diseases	Explain how the diseases				
can be checked	can be checked				
	lerstand how character is inh	erited			I
20.1 Explain the following		Textbooks			
terms:	terms:	Journals			
• Genetics,	• Genetics,	Whiteboard			
 Heredity and 	- Genetics,	Marker			

• Inheritance	• Inheritance	Computer Internet			
20.2 Differentiate between Hereditary and Genetics	Explain the differences between Hereditary and Genetics	Projector	K	STO -	
20.3 State Mendel's law	Explain Mendel's law			>	
20.4 Explain mono-hybrid and dehybrid inheritance.	Explain mono-hybrid and dehybrid inheritance.		ACA		
20.5 Define linkage and sex-linked characters	Explain linkage and sex- linked characters	A CX	≻		
20.6 Explain how sex-linked characters are inherited.	Explain how sex-linked characters are inherited.				
20.7 Explain how to solve problems with 20.1	Explain how to solve problems with 20.				
ALUATION A:60% AMS: 40% TAL: 100%	BOAR				
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DDACTICAL MANUAL DASIC SCIENCE

CENED AL DIIVOLOG L	PRACTICAL MANUAL BASIC SCIENCE
GENERAL PHYSICS I	1. Perform simple activities to demonstrate scientific principles:
STP 101	• Falling from a height
	• Floating of objects in water.
	2. Carryout experiments to illustrate the following:
	• Circular motion
	Rational motion
	• S.H.M
	3. Demonstrate the methods of measurement of length time-using stop watch as in the
	application of simple pendultim and mass
	4. Perform experiments in the measurement of mass using beam balances, replace length
	using vernier callipers and meter-ruler; time, using stop watch, simple pendulum.
	5. Perform simple experiments to illustrate the principles of :
	Operation of levers
	Inclined planes
	Pulley's
	Hydraulic press
	6. Demonstrate experimentally the effects of heat energy e.g.:
	Ball and ring experiment
*	Melting of ice
	Boiling of water to form steam.
	7. Perform simple experiments to illustrate.Conversion of energy from one form to anoth

	8. Perform experiments to illustrate conduction, convection and radiation:
	• Conduction of heat through a metal rod,
	• Convection in air and radiation through different materials.
	9. Illustrate experimentally the concept of waves using examples such as:
	Ripples on water
	Waves on string
	Helical string
	10. Conduct some simple experiments to demonstrate properties of waves:
	• Reflection
	• Refraction.
	11. Measure angles of incidence and reflection
	12. Conduct simple experiment to demonstrate different sound produced by different
	instruments.
	13. Identify the different sounds produced by string, wind and percussion
	14. Perform simple experiments on reflection and refraction:
	Curved mirror experiment,
	• Refraction through a glass block,
2	Refraction through water
	15. Perform experiment to illustrate dispersion of white light by prism and relate to its
Ar.	formation of rainbow.

	 16. Perform simple experiments to illustrate various effects of: Electric current, Heating effects as in heating coil, Electric bulbs Sound effects as in bell, loud speaker, microphone 17. Perform simple experiment to show the relationship in above using torch bulb, wires and relevant instruments 18. Insert a fuse in an electric current
GENERAL PHYSICS II STP 301	19. Fit a cable into a plug 1. Perform simple experiments to measure velocity and speed 2. Solve problems using equations derived in 3.2 above
	 3. Solve simple problems on motions 4. Conduct simple experiments on the following : Elasticity, Stress
	 Strain Elastic limit 5. Demonstrate the application of elasticity in day-to-day life.
TIONA	6. Use the goldleaf electroscope to determine the nature of charges on different bodies.
2A	

	10r
	 7. Perform some laboratory activities to generate some static electricity such as: Rubber balloon and glass rod experiments Metal sphere experiment etc.
	 8. Conduct simple experiments in electricity such as: Light bulb experiment Resistor experiment etc.
	 9. Conduct experiments in thermometric diquids and thermometers such as: Thermal expansion experiment Calibration of thermometers Thermometer comparison experiment
	 10. Conduct simple experiments on water wave such as: Wave generation, Reflection and Refraction of waves.
GENERAL CHEMISTRY I STC 101	 Carry out the electrolysis of water using Hoffman Voltmeter to identify the constituents of water Carry out distillation of water to produce distilled water which can be used for routine experiments in laboratories and charging of batteries.
	8. Carry out simple test for acids, bases and salts.
AA	 4. Use indicators to distinguish between acids, bases and salts. 5. Carry out acid base titration.
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\mathbf{Y}	

	6. Obtain salt such as sodium chloride from sea water by evaporation process.
	7. Carry out an experiment to produce soap from palm oil and potash rich ashes.
	8. Carryout an experiment to produce ethanol through the fermentation of locally available cereals.
GENERAL CHEMISTRY II STC 301	1. Conduct some simple experiments of water quality (physical and chemical).
	2. Conduct some experiments on acids, bases and salts (for example acid-base neutralisation, preparation of salts e.g. sodium chloride and copper sulphate)
	3. Illustrate the tetrahedral arrangement of carbon bonds.
	4. Clean laboratory equipment's and apparatus.
	5. Dry the apparatus either in hot oven or in air.
	6. Observe the affects of heat and reagents on substances.
GENERAL BIOLOGY I STB 101	1. Observes some cells under the microscope (e.g. a plant cell, and animal cell)
	2. Draw and label the cells observed in above practical
	3, Draw and label the digestive system in man
4	4. Demonstrate osmosis and diffusion by simple experiments.
	5. Draw and label the structure of a mammalian heart.
GENERAL BIOLOGY I	1. Prepare cell slides using onion



LIST OF EQUIPMENT FOR BASIC SCIENCE

1000ml beakersAcidAcidAgsortedBalanceAgsortedBallAssortedBasesAssortedBeakerImage: SortedBeam balancesImage: SortedBeating drumImage: SortedBellsImage: SortedBuilding sticksImage: SortedBursen BurnerImage: SortedBuretteAssortedCableAssortedCableAssortedClampImage: SortedCopper sulphateImage: SortedCover slipImage: SortedDistillation ApparatusImage: SortedDistillerAssortedDistillerAssorted			
N EQUIPMENT QUANTRY 1000ml beakers Acid Assorted Balance 2 Ball Assorted Balance 2 Ball Assorted Bases 2 Balnee 2 Beaker 2 Balnee 2 Beaker 2 Bases 2 Beating drum 2 Beating drum 2 Bells 2 2 2 D Building sticks 2 Burette 2 2 3 Cable Assorted 4 Car battery Assorted 5 Circuit 2 6 Clamp 2 7 Colours Assorted 3 Copper sulphate 2 0 Curved mirror 2 10 Distillation Appearatus 2 2 Distiller Assorted			
N EQUIPMENT QUANTRY 1000ml beakers Acid Assorted Balance 2 Ball Assorted Balance 2 Ball Assorted Bases 2 Balnee 2 Beaker 2 Balnee 2 Beaker 2 Bases 2 Beating drum 2 Beating drum 2 Bells 2 2 2 D Building sticks 2 Burette 2 2 3 Cable Assorted 4 Car battery Assorted 5 Circuit 2 6 Clamp 2 7 Colours Assorted 3 Copper sulphate 2 0 Curved mirror 2 10 Distillation Appearatus 2 2 Distiller Assorted			
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N EQUIPMENT QUANTRY 1000ml beakers Acid Assorted Balance 2 Ball Assorted Balance 2 Ball Assorted Bases 2 Balnee 2 Beaker 2 Balnee 2 Beaker 2 Bases 2 Beating drum 2 Beating drum 2 Bells 2 2 2 D Building sticks 2 Burette 2 2 3 Cable Assorted 4 Car battery Assorted 5 Circuit 2 6 Clamp 2 7 Colours Assorted 3 Copper sulphate 2 0 Curved mirror 2 10 Distillation Appearatus 2 2 Distiller Assorted		LIST OF FOURMENT FOR BA	SIC SCIENCE
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Acid Acsorted Balance 2 Ball Assorted Bases Assorted Beaker Image: Constraint of the second seco	S/N	EQUIPMENT	QUANTATY
Balance Assorted Ball Assorted Bases Image: Solution of the second s	1	1000ml beakers	
Balance 2 Ball Assorted Bases Beaker Beam balances Image: Constraint of the system of the	2	Acid	Assorted
Bases Beaker Beam balances Beam balances Beam balances Beating drum Bells Bullding sticks D Building sticks Bunsen Burner Burette 2 Burette 3 Cable 4 Car battery 5 Circuit 6 Clamp 7 Colours 8 Copper sulphate 9 Cover slip 10 Distillation Apparatus 2 Distillation Apparatus 2 Distiller 3 Drawing materials	3	Balance	
Beaker Beam balances Beating drum Bells Building sticks Bunsen Burner 2 Burette 3 Cable 4 Car battery 5 Clamp 7 Colours Assorted 3 2 Cover slip 0 1 Distillation Apparatus 2 Drawing materials	4	Ball	Assorted
Beam balances Beating drum Bells Bells D Building sticks Bunsen Burner Burette 2 Burette 3 Cable 4 Car battery 5 Circuit 6 Clamp 7 Colours 8 Copper sulphate 9 Cover slip 9 Curved mirror 10 Distillation Apparatus 2 Drawing materials	5	Bases	
Beating drum Bells Bells Building sticks Bunsen Burner Bunsen Burner Burette Assorted Cable Assorted Car battery Assorted Circuit Clamp Colours Assorted Copper sulphate Ocover slip Ocover slip Ocover slip Ocover slip Ocover slip Ocover slip Assorted Distillation Apparatus Assorted Drawing materials Assorted	6	Beaker	
Bells Building sticks Bunsen Burner Bunsen Burner Burette Assorted Cable Assorted Car battery Assorted Circuit Clamp Colours Assorted Corper sulphate Cover slip Curved mirror Distillation Apparatus Distiller Assorted	7	Beam balances	\mathbf{X}
Building sticks	8	Beating drum	Y
Bunsen Burner Burette Burette Assorted Cable Assorted Car battery Assorted Circuit Circuit Clamp Assorted Copper sulphate Assorted Cover slip Curved mirror Distillation Apparatus Assorted Distiller Assorted	9	Bells	
2 Burette Assorted 3 Cable Assorted 4 Car battery Assorted 5 Circuit Assorted 6 Clamp Assorted 7 Colours Assorted 8 Copper sulphate Assorted 9 Cover slip O 9 Curved mirror Distillation Apparatus 2 Distiller Assorted	10	Building sticks	
Cable Assorted 4 Car battery Assorted 5 Circuit	11	Bunsen Burner	
4 Car battery Assorted 5 Circuit	12	Burette	
5 Circuit 6 Clamp 7 Colours 8 Copper sulphate 9 Cover slip 9 Curved mirror 1 Distillation Apparatus 2 Distiller 3 Drawing materials	13	Cable	Assorted
6 Clamp Assorted 7 Colours Assorted 8 Copper sulphate Image: Cover slip 9 Cover slip Image: Cover slip 9 Curved mirror Image: Cover slip 1 Distillation Apparatus Image: Cover slip 2 Distiller Image: Cover slip 3 Drawing materials Assorted	14		Assorted
7 Colours Assorted 3 Copper sulphate	15		
8 Copper sulphate 9 Cover slip 9 Curved mirror 1 Distillation Apparatus 2 Distiller 3 Drawing materials Assorted	16		
O Cover slip O Curved mirror I Distillation Apparatus 2 Distiller 3 Drawing materials Assorted	17		Assorted
O Curved mirror I Distillation Apparatus 2 Distiller 3 Drawing materials Assorted	18		
Distillation Apparatus Distiller Drawing materials Assorted		Cover slip	
Distillation Apparatus Distiller Drawing materials Assorted	20	Curved mirror	
B Drawing materials Assorted	21	Distillation Apparatus	
B Drawing materials Assorted 4 Dropper Image: Constraint of the second se	22		
Dropper >	23	Drawing materials	Assorted
	24	Dropper >	

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25	Elastic band	
26	Electric bulbs	Assorted
27	Epithelium cell from the cheek	
28	Evaporating dish	
29	Floating objects	Assorted
30	Free-falling objects	Assorted
31	Fuse	Assorted
32	Gas	
33	Glass block	
34	Glass rod	
35	Goldleaf electroscope	
36	Heating coils	
37	Heating mantel	
38	Hoffman Voltmeter	
39	Hydraulic press	
40	Inclined planes	
41	Indicator	
42	Knife	Assorted
44	Lever	
45	Light bulb	Assorted
46	Litmus paper	
47	Loud speaker	1
48	Magnifying glass Magnifying lens	
49	Magnifying lens	
50	Measuring Tape	Assorted
51	Metal rod	
52	Metal sphere	
53	Meternuler	

		_
		\sim
54	Microphone	1
55	Microscope	
56	Millet	Assorted
57	Oil	Assorted
58	Onion	Assorted
59	Oven	2
60	Perfume	Assorted
61	Permanent slides	
62	pH meter	
63	Pipette	
64	Plant Specimen	Assorted
65	Plug	
66	Potato	Assorted
67	PPE	Assorted
68	Prepared slide	
69	Prism glass	
70	Pulleys	
71	Pyrex glass	
72	Resistor	
73	Retort Stand	
74	Ring	
75	Rubber balloon	Assorted
76	Ruler	Assorted
77	Salt 🔨	Assorted
78	Sample reagents	Assorted
79	Sea water	Assorted
80	Shallow Basin	1
81	Simple pendulum	Assorted

82	Slides	Assorted
83	Soap	Assorted
84	Sodium chloride	
85	Soil Sample	Assorted
86	Spatula	
87	Speedometer	
88	Stirrer	
89	Stop-watch	
90	Strings	
91	Thermometer	
92	Thermometric liquids	
93	Touch Light bulbs	
94	Tripod Stand	
95	Tripod Stand Wire Gauze	
96	Vernier callipers	
97	Volumetric Flask	
98	Water bath	
99	Wire gauze	
100	Wires	Assorted
101	Writing materials	Assorted
	the blue	