

# BIOLOGY SYLABUS



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## INTERIM JOINT MATRICULATION BOARD EXAMINATION (IJMBE)

SECTION (2102 DESIVER) SUBALLYS YDOLOIG SYSTEMS

SECTION D: BIOSTATISTICS

1. Introduction:

SECTION E: BASIC MICROBIOLOGY

The IJMB Biology syllabus is designed to provide a guide for instruction at colleges of advanced studies (A Levels), which prepare students for entry into the 200 level Biology programmes in Nigerian Universities. assumes that students of Biology at this level have completed the 'O' Level Biology syllabus as prescribed by WAEC/ NECO: The syllabus is planned for delivery over a contact period of at least 12 months.

E lo ElAs much las possible, students vare expected to rexpand their skills in observation, classification and interpretation of biological data; and uto develop a scientific attitude to problem solving. It is also expected that their abilities to apply biological principles in everyday life will increase. A

Botany and Basic Microbiology)

Candidates will be required to answer FOU resvirasido bins amiAs. 19 went This syllabus has the following aims and objectives: . solie oup 1277 questions covering relevant areas of the syllabus, will be compulsory. The

To further develop a candidates of understanding wof elevels of

organization in living organisms.

lo alevai. Tali To enhance candidates eknowledge of the natural (taxonomic) relationships between the various plant and animal phyla.

(emining To increase candidates capacity to relate structure and function Protoctista within living systems.

To develop candidates' competence in application of simple iv. statistical concepts in biological studies.

To introduce candidates' to basic concepts in microbiology, as ٧. relevant to plant, human and animal life and Section C:

To increase candidates' understanding of simple ecological vi. concepts and their applications in everyday life.

To enhance candidates' understanding of the major principles of netergrophic genetics and their relevance to heredity.

To expose candidates to the theories of evolution and the role of viii، natural selection in the evolution of living organisms.

Respiration (as applicable)

The syllabus is therefore organized into eight (8) major sections, viz:

Growth and development

SECTION A: SUBCELLULAR MANDO CELLULAR LEVELS OF

Section D: Biostatistics **ORGANIZATION** · Hairon

SECTION B: DIVERSITY OF ORGANISMS Section E: Ecology 11

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**SECTION** C: FORM AND FUNCTION OF LIVING SYSTEMS

**SECTION D:** BIOSTATISTICS

**SECTION** E: BASIC MICROBIOLOGY

SECTION F: ECOLOGY
SECTION G: GENETICS
SECTION H: EVOLUTION

#### 3. Examination Scheme:

The IJMB Examination in Biology will consist of two Theory Papers of 3 hours each, which together will constitute 60% of the final mark.

## A. Paper I: GENERAL BIOLOGY AND BOTANY (Statistics, Ecology, Botany and Basic Microbiology)

Candidates will be required to answer FOUR out of SIX questions. The first question, which will include statistics in addition to short answer questions covering relevant areas of the syllabus, will be compulsory. The paper will cover the following sections of the syllabus:

Section A: Plant Tissues (see Cellular and sub cellular levels of

organization)

Section B: Diversity of Organisms (Plants and Plant like organisms):

1. Protoctista

2. Algae

3. Fungi

4. Plants

### **Section C:** Form and function of living systems:

- 1. Plants
  - a) Plant structures
  - b) Nutrition in plants (Autotrophic & heterotrophic Nutrition)
    - c) i. Vascular systems in plants
      - ii. Transport in plants
  - d) Respiration (as applicable)
  - e) Reproduction in plants
  - f) Growth and development

ection D: Co-ordination (as applicable)

Section F: Biostatistics

Section E: Basic microbiology
Ecology

# B. Paper II: GENERAL BIOLOGY AND ZOOLOGY (Genetics and Evolution, Cell Biology and Zoology)

Candidates will be required to answer FOUR out of SIX questions. The first question, which will be drawn from Genetics and will include short answer questions covering the relevant areas of the syllabus, will be compulsory.

The paper will cover the following sections of the syllabus:

- Section A:

  1. Animal Tissues (see Cellular and sub cellular levels of Organization
  - 2. Cell processes
  - 3. Enzymes
- Section B: Diversity of Organisms (Animals and Animal like organisms):
  - 1. Protoctista
  - 2. Protozoa
  - 3. Animalia
- **Section C:** Form and function:
  - 2. Animals
  - a) Nutrition in Animals
  - b) Transport in vertebrates
  - c) Respiration (as applicable)
  - d) Excretion in Animals
  - e) Support and Locomotion in Animals
  - f) Reproduction in Animals
  - g) Growth and development
  - h) Co-ordination (as applicable)

Section G: Genetics
Section H: Evolution

NOTE:

The above grouping of the various sections of the syllabus is for Examination purposes only and is therefore purely for convenience. Inevitably, there are a few areas of overlap (e.g. Cell Biology and Cell Physiology).

Historic background and experimental approaches, which led to major biological discoveries, are to be touched upon in appropriate topics to create interest and curiosity in students. While it is necessary that physical and chemical principles underlying biological phenomena be understood, the detailed study of

complex chemical processes e.g. Whe best of the shift, and unit effect) is not required.

Candidates will be required to answer FOUR out of SIX questions. The first question, which will be drawn from Cenetics and will include short answer questions covering the religing Wallangary About be

Practical work will form an important and integral part of the course. Candidates will be taken through a course of practicals, based on theory wherever possible and thereby covering all the major topics of the syllabus. These shall be assessed internally and the marks obtained shall constitute a percentage of the Final Mark in Biology.

The IJMB Secretariat may, at any time, require that candidates' Practical

Notebooks be submitted for inspection by Chief Examiners and Moderators.

In addition, each college will arrange a formal practical examination for its candidates during the course and the mark obtained during this examination shall constitute 20% of the final grade in Biology. The IJMB Secretariat may require the submission of the question papers and the scripts to the Chief Examiners and Moderators for scrutiny.

#### PAPER III: PRACTICAL WORK

In this course, practical techniques, such as the use of light microscope, making slides (not permanent preparations), dissection of plants and animals and how to make biological drawings, should be emphasized. There is no special syllabus for practical work. Some suggestions are listed below:

1. Introductory Practical How to make drawings, use of microscope, cell study using plant cells (e.g. onion peels) and animal cells (e.g. cheek scrapings).

The above grouping of the various sections of the syllabus

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- is for Examination purposes only and noitaginizally. So convenience. Inevitably, there astajaotora. etc. (a) overlas
  - convenience, mevitably, more are extended (e.g. Cell Biology and Cell Physical Av). i
  - ii. Protozoa
  - Historic background and experimental approaches, ignue leadele
- (c) and Plants (Bryophytes, Pteridophytes, Gymnosperms, Ar.giosperms)
- (d) Animals, (Cnidaria, / Coelenterata, Platyhelminthes, Annelida, Nematoda, Mollusca, Arthropoda, Chordata)

Morphology of Angiosperms – Roots, stems, leaves, flowers (floral diagrams and floral formulae; one dicot, one hermaphrodite, one unisexual, one monocot). one monocot).

& stooonom dod do seves bears, stoop of states of squash greparations), stoop of states of states of states (ascorptions), stoop of inheritance using coloured beards, beams, cic. Problems probability.

- Animal Form and Function and Assuitable vertebrate (e.g. rat, rabbit, 5. guinea pig), fowl, lizard, etc. to show features and viscera; venous, arterial, digestive and urinogenital systems, heart. Display of external features of outquous assessment shall form an element of the final examination,
- Physiology Food tests, digestion using enzymes, enzyme experiments 6. (effects of varying concentrations, temperatures and pH). Osmosis (using onion peels or other suitable yams, materials). Plasmolysis. Blood groups. Growth (rate of growth of leaves and stems).
- Transpiration Relevant experiments (mostly demonstration), e.g. 7. transpiration rates measured by loss of weight methods/cobalt chloride paper, photometer, root pressure (manometer).
  - Respiration Use of respirometers (using small insects, plant materials, 8. etc.).
  - Photosynthesis Mostly demonstrations of the effects of varying light intensities, CO<sub>2</sub> concentration and temperature. Extraction of chlorophyll, 9. measurement of PPS in leaf disks.
- Alimentary canal (stomach ileum and duodenum), liver, kidney, testis, ovary, muscle (cardiac, striated, non-striated, smooth), 10. tissues (epithelial: ileum, duodenum and skin), skeletal tissues (bone, cartilage), connective tissue (including blood).
- Ecology Measurements of abiotic factors, Estimation of populations (plants and animals), investigations of soil organisms (not microorganisms), Moisture, organic matter, air, porosity and capillarity.
- Statistics Measurements of statistical variables, frequency distributions, 12. histograms, curves, frequency cumulative

measurements of central tendency (means, median, mode), measurements of dispersion (ranges, standard deviation, variance), concepts of probability.

Genetics – Mitosis and meiosis (use of slides or squash preparations), demonstration of inheritance using coloured beads, beans, etc. Problems on Mendel's "laws", and deviations from them.

## D. CONTINUOUS ASSESSMENT:

Continuous assessment shall form an element of the final examination, accounting for 20% of the Final Mark. This shall consist of:

(a) Continuously assessed practical work - 10%.

(a) Continuously assessed placeton - 10%.

# DETAILED SYLLABUS FIRST SEMESTER SYLLABUS

SECTION A: SUBCELLULAR AND CELLULAR LEVELS OF ORGANIZATION

S/	TOPICS AND CONTENTS	ACTIVITIES	INSTRUCTIONA	DURA
NO	110	ACTIVITIES / PRACTICAL	L MATERIALS	TION
3	24 0 1- topic	GUIDE	LMATERIALS	L
3	The Part Zight of a	GOIDE	ent o val 🕬 🕸 🛊 2	P
	The second secon		otteliti, projecterini	
	p CHEF II II			Hours
1.	THE GENERALIZED CELL			18 9
1.	(a) The cell as a fundamental unit of			
5	structure and function '			$\mathbf{J} = \mathbf{J} + \mathbf{J} + \mathbf{J}$
Ĭ	A brief definition of cell and		Halls and the second	
1	summarized form of cell theory			- Li
Si en di	i. Microscopes and Microscopy	A practical class on		
		how to make		
	The parts, drawing and naming of the	Biological drawings,		
ļ	parts, functions, advantages and	recording and	The state of the s	cult'
į.		reporting of practical	, innercoscopes,	ıs
	should be enumerated. Brief account	should		g
	of function of electron microscope,	introduced. The use		ran i
	types, functions, advantages and	handling, drawing		
1	disadvantages. Use of dissecting	labelling and	California de la companya del la companya de la com	100
1	microscopes	functions of a ligh		
1	ii. Animal and plant cells as seen	microscope shoul	d .	10 1/2
	under light microscope.	be emphasized		
	A simple treatment of the structure of	garanta an	edp I	// " " !
Ť	cellular constituents of plant and	Server delle	a	/ · · · · ·
	animal cells as seen under light	Practicals should b	be	
	microscope with emphasis on -shape,	conducted to stud		
	structure and functions	plant cell (usin		1//
Ţ		onion bulb/toma		, 5 P 4 2
	iii. Ultrastructure/Fine structure of	fruit) and animal co	ell	1/
4	.11	1 (0, 2,		1 /4
	the cell  A detailed treatment of the fine	scrapings). Empha	SIS	the first
	structure and functions of various	should be placed	on page of	1
	cellular constituents as illustrated by	simple co	ells	
	cellular constituents as master	constituting	the	
1	the electron microscope in plant and	bodies of both pla	ints	Service III
	animal cells especially: plant cell nucleus,	A 46 1		
	יייייייייייייייייייייייייייייייייייייי			1
	wall, memoranes, endoplasmic reticulum, golgi bodies, endoplasmic reticulum, mitochondria,			4 17 7
			AND SERVICE SERVICES	
	autoskeleton, centrioles, circa,	12m(v.) (*86.)	3.27	1.7
			1	No. of the last of
	- A I I AM CITILITY OF THE			
	iv. Molecular structure		in the	577
	plasma membrane	. 34	Provide pla	in glass
5 <b>1</b>	- Differences and similarities	. 1	LIOAIGE big	

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between the fine structures of plan	at 208ALIY slides with cover 12 upon
OIT and Appinal a Cells a should Ab	PALV NOTES
highlighted.	SHOTTI Spivord Supported ULAR AND CELLUS
ASULT AMOUTOURE LUCKA	relevant permanent slides. Provide
A simple illustration of a triple	Permanent/prepared relevant stains, etc.
layered structure of the cel	I slides should be used Drawids 1
membrane (i.e. protein – lipid	to allow candidates materials/
protein molecules)	observe, draw and specimens
Hours Hours	label chromosomes
(b) Mitosis and Meiosis as a basic	(e.g. Onion or Lilly
processes of cell multiplication	THE GENERALIZED Ingit room root tips under light toor
	microscope mindantegral of microscopin equation microscopic
i. Mitosis - Definition of mitosis,	
where it takes place and its	Fridais should be
significance in multiplication for	- Controllent
growth and development of living	
organisms, illustrating the different	
stages/phases of mitosis and the role	The parts, dray upg and names of the parts, dray upg and names and recording
I I Diayeu Dy caen bhase	other associated assoc
ii. Meiosis - Simple definition of	disadvantages of a light microscoped reportion of the should be enumerated. But account should
mejosis wherever 11 1 520 5dT, box	STORIG DE ENGINEERICH, LITTES ACCOUNT.
meiosis, where it takes place and its significance in the evolution of plants	
and animals illustration of plants	y prepared slides of repared 1998
stages and sub-stages of meiosis in	d sadvantages. Use of these ad blunds
both first and second meiotic division	identify, draw and sogoozoroin
bezisel	label the stages and plant colleges and
iii. Gametogenesis - Meiosis as a	r sub-stages of sub-solution in the result is the
means of gamete formation with	
	placed on
P	the nature, number 1502 as also laming
	and orientation of diagram diversions of animal diagram diversions
macrosporogenesis should be briefly discussed and illustrated	the chromosomes to snottent and functions to
lieu ismine bo	structure/Fine structure of fruit):
iv. Comparison between Mitosis	
rv. Comparison between Mitosis and Meiosis - Emphasis should be	
given to points highlighting	structure and functions of the fine scrapin
dontrasting differential	structure and functions of various
Detween 1	
	********   ***** *******
organization to concept of	animal cells especially plant cent and an
organs and syste organisms: tissues,	Wall, memoral makes.
	endoplasmic reticulum golgi bodies.
Definition and classificat.	lysosomes, vacuoles, mitochondria,
tissues, organs and system as level.	cyroskeleron, centriole, cilia, flagella
of organization	and chloroplasts, ribosome
	Study of he outstand statement by
(c) Plant Tissues	slides of stem bent mandment anisati
2 j. Parenchymatous tissues	to locate, draw and
ii. Collenchymatous tissues	Label parenchyma.
	10

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-	LIDI OADED DWWAAAA D	EADNICEDIANETWORK COM
	iii. Sclerenchymatous tissues	EADNIGERIANETWORK.COM
	Vaccular on Canal	sclerenchyma cells SHMYZ H
		sclerenchyma cells,
	A study of (i - v) plant tissues, instead of composition.	the gnation of design solutions of design solu
	2501/2005 150103,	SUPERIORS OF THESE PROPERTY OF THE SUPERIOR SUPERIOR OF THE SU
	distribution, forms and functions of or	role in biochemical reaction of bellocing the control of biochemical another in the control of biochemical reactions.
(4) . t.	distribution, forms and functions of each tissue	reperions and industrial usage of such as
	enzymes sucrose), etc.	Ha
	(d) Animal Tissues bas noner	enzymes should be stressed  fo eabile transmission of the stressed principle of the stress of the st
	i. Epithelial tissue	Permanent slides of
	ii. Connective tissue Skeletal	The differentitions of tage in manually in the last tage
	ii. Muscular tissue Skeletal	
	III. Iviusculai ussuc	connective, skeletal, demodern in nacional .
N 1	iv. Nervous tissue	muscular specific nature (bna enzymes raluseum)
	A study of (i - iv) animal tissues,	
	emphasizing types, classification,	should be provided
	structures, arrangement, functions	in a practical class moitiding enzyme (1)
	and importance of each tissue	Symmon (1)
		i. Non-competitive reversible anidate pridate in the little anidate in the little anidat
		- L L Non-covanebitive utility 225/2016 a.
	A CONTRACT OF THE CONTRACT OF	Examples of enzyrieni inhibitoril right
	WW media	Examples of enzytieni innoitaciól rient should also include drugs and pogbod slamina
2		
		(ii) Co-factors
(Alex		i. Inorganic ions
	V Compatible on	ii. Prostnetic groups, and
		ii. Co-enzymes
		Examples and types of reaction they
		act on should be given
		L DIVERSITY OF ORGANISMS
	and the second s	
2 10	2	a)The principal groups of
		(rganisms. The super kingdoms
	III (AY	and the five kingdom system of
		dassification
		A general survey of the Super
	students in Kelevant	Lippdoms Fukaryong The major France
		21 differences between Prokaryotae and collection
12.	( PIRPROCESSES	
-		Cotatogns abivore of the 5 identification
	(a) Biólogical processes in cells 1011	Prokurya. Tatamaman : alamis E. Classifica
	available keys analesissed	Prokaryon Telemomico di politica con la regiona di politica di pol
		1 - total and the state of the
11	ii. Diffusion (275)	and demonstrates bthese sfilaments, to sred blood scells a setc.
	Outline of definitions and principle	eso processes, to animal Provide hypotonic
	bittine of domination figure 19 of the	se plant and same and sathypertonic
	Discuss the significant	grocesses) to dusing ablood a persenguistic provide hypotonic plant and a sandaranimal solutions
1		
	and external environment of cel	b) Classification (classification
11 -	and equilibria involved orare of lot	value of classification of organisms. keys med
	required. Brief mention of not	Definitions of taxonomic terms: keys man
	lequired. Diter	SIS, I a main of the second se
	processes SIICH 45	Classification Systematic. Taxon.
	processes such as haemolys phagocytosis and pinocytosis	Taxon. Systematic. Taxon.

in - in -				and and an a
			6	3
3.	ENZYMES	Professional Professional	within a trader	
	(a)Characteristics of enzymes and	Experiment should	Provide relevant	
	role in biochemical reactions	be undertaken to	enzymes (e.g.	
	The importance of biochemical	determine factors	invertase) and	
*	reactions and industrial usage of	such as temperature,	substrates (e.g.	
	enzymes should be stressed	pH, enzymes	sucrose), etc.	
	elizymes should be buessed	concentration and		
3	(b) Mechanism of enzyme action	substrate	20 USSE EDITOR (13)	
1	i. Lock and key hypothesis	concentration that	I am ROMATIGA A	
i i	ii. Induced fit hypothesis	affect the rate of	To a Submitted in	
1	The specific nature of enzymes	enzyme catalysed	SIZZ TO SEE SEED OF	
	The specific hattire of enzymes	reactions	argen alterno?	
	should be emphasized	1000	(1.141 - 1.141)	
		in a street tal.	2 23(71) 11 (10,112)	
	(c) Enzyme inhibition	a na ben chart j	A CHARLEST AND CA	
	i. Competitive	Section 1995	raises in la suggest be,	
1	ii. Non-competitive reversible	galiba "		
	iii. Non-competitive irreversible	a*1. 117*		
	Examples of enzyme inhibitors	1850		
	should also include drugs and poison	(arriba		
	• 1			
į.	(d) Co-factors			
1	i. Inorganic ions		1	
	ii. Prostnetic groups, and		1	
	iii. Co-enzymes		-	i
1	Examples and types of reaction they			
	act on should be given			
4.	DIVERSITY OF ORGANISMS			
1.	(a)The principal groups of			12 6
	organisms. The super kingdoms		6	12   0
	and the five kingdom system of			
	classification			
1 100				
1	A general survey of the Super			
	Kingdoms. Eukaryotae. The major	Engage students i	n Relevant	
	differences between Prokaryotae and	collection,	specimens, simple	-
	Eukaryotae. An overview of the 5	identification an		
	Kingdoms of organisms:		of (such as numbered	
1 4 6	Prokaryotae, Protoctista Fungi	locally available	• • • • • • • • • • • • • • • • • • • •	
. 10	Plantae and Animalia. A note on the	specimens into the		
	status of the protozog and alone		AND THE CASE OF	
	bisunguishing teatures of each of a			0.5
	Maior dicc		on become the to a serve	a li
MI.	between plants and animals	- CALCIII	al and an annual	
	roms and animals	features to illustra		
	(b) Classification	41 .	-C	
	A general idea o			
	A general idea of the meaning and value of classification of	l use of	he of which has been	
	value of classification of organisms  Definitions of taxons in tax		iic   miles   miles	
Man de La	Definitions of taxonomic terms	keys in identification	on	
	- Cuche			
	Systematic, Taxon	,	18 18 18 18 18 18 18 18 18 18 18 18 18 1	

molecular hint	READNICERIANETWORK.COM	
	By the state of th	7
brief discussion of the binomial	The state of the s	
system of nomenclature and its rules	The second of th	
5. PROTES	A A Little of the second tests with the second test of the second tests of the second	
5. PROTOCTISTA	erest tetalini .	j.
de la constant de la	12 6	-
(a) Algae	TO JOHN THE RESIDENCE OF THE PROPERTY OF THE PARTY OF THE	1
i. Morphology and classification Outline the major classocities:	The second secon	
Outline the major classes/divisions of classes.	219951 7	
the algae. Study the general	Students should Relevant algal	7
characteristics of the phylum	collect and classify specimens	
Classify algae up to the generic level.	specimens of algae	
characteristics of indicate diagnostic	10 /C 10 / Clarenter property of a	1
characteristics of individual classes		1
Discuss at		
Discuss the range of forms as seen in unicellular, colonial si	Students should	
unicellular, colonial, filamentous,		
siphonaceous and thalloid genera  (e.g. Chlorella Cl.	observe and draw	<u>.</u>
	specimens of algal species	1
Volvox, Spirogyra, Fucus, Laminaria, etc.)	opecies many many many many many many many many	1
etc.)	bry significant transfer seeds of the	1.1
1	reads seem of	1
ii. Importance	53134657612	
Discuss economic/ecological	Marketon II	
importance of algae (e.g. as basis of	selection of the sufficiency of the sufficiency	
aquatic food chains, roles in	The said to parel your fine to	
eutrophication, of water treatment.	Color solitationistic most open constitution of	
limestone formation, uses/products,	Compared to a state of the contract of the con	
etc.)	TOWN COMPONENTS OF THE PARTY OF	
	Students should Relevant	
(b) Protozoa	collect and classify protozoan	
i. Morphology and classification	specimens of specimens	
Outline the major phyla of the	protozoa	
	protozoa lo renomene lo zeoció	
protozoa and their characteristics.	े कार केला मार्गिक केला है। जा का का केला केला केला केला केला केला के	1 1
Classify the protozoa up to generic	Students should	١.
level. Outline major diagnostic		
characteristics of individual classes	observe and draw	
Discuss the range of forms as seen in	specimens and slides	- 1
simple and complex types using	g or protozoans	
examples such as Amoeba	Mary many and all as standards by	- 1
m : 1 - manage	DOISE TO BE DESCRIPTION OF THE PROPERTY OF THE	.
	MUNICIPAL II TO MACHINE VI DESCRIPTION OF THE PERSON OF TH	1
Paramecium and Plasmodium		
ii. Importance	f	
Discuss the economic importance of	f stydgale raff 1	<del>-</del>
protozoa	12	4
i. FUNGI	and the standard of the same	
i. Morphology and classification	Students should Relevant fungal	
1		
Outline the major funga	al Students should Relevant	

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	classes/divisions. Study the general	College
	i criaracteristics of the	specimens of the first to hongon A 15
H	Classify the function to low.	resiment of the
	I diagnostic facture of	brief discussion of the binomial lgmbr
	individual classes	25 ur ati buo anutalana man la mata/2
6	Discuss the range of forms and mode	
	of nutrition as seen in unicellar	
	muni-centular types eg Voorte	Silouid
	William A	1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
	Penicillium.	specimens of fungities to bus vgolodenold
-	Mushrooms, etc.	Morphology and Chastification  Outline the major classes/divisions of Students the aleae Study disconnect collect
	in importance	13031103 (18131138 011) (2011)
		el aracteristics of the phylum, specime
	importance of fungi (see section E)	Cassify algae up to the generic level.
7.	LICHENS	oiteoragib tointi
	Types and range of forms.	Characteristics of individual classes
	Economic/ecological importance e a	
-	in succession, as sources of dyes, etc	D scuss the range of feaths as seen in Student
8.	I PLANTAF	9 81 interpression chartel, filamentous, observe
	ns of algal	Siphonaccous and the lloid general specime
	Outline the major groups of plants.	(e.g. Chlorella, Chrimydomonas, species
	Discuss their major differences and	Volvox, Spirogyra, Fucus, Liminaria,
	characteristics	
		i. Importance
es-relatives	(a) Bryophyta	
	i. Morphology and classification	Students: should Relevant
	Outline the major classes of the	Scuss econogical properties of and classify the collect and classification and classification are collected as a collected and collected are collected as a co
1	bryophyta and their characteristics.	eutrophication, diverge treatment, and treatment and
and the second	Classify the bryophytes up to the	linestone formation, uses/products.
	generic level. Outline major	intestone ionnation, asessphoneers, v 1
	diagnostic characteristics of the	ele.)
	individual classes, with reference to	(f) Frestezoa collect
1	representative species, e.g. Riccia	
1	Marchantia, Funaria, Polytrichum,	
	etc. Discuss alternation of	
	generations in these plants	protozoa and their characteristics.
		Cassify the protozon up to generic .
	features that facilitated the transition	level. Outline major diagnostic Studen turveley diagnostic observe observe observe
	from water to land sobils one sur-	Students of monthly local control of the state of the sta
		examine and draw interidontytes
	Outline economic/ecological roles of	specimens. of
	these plants, e.g. in succession, soil	examples such as Amorbia, and displayed
7:	enrichment, retardation of erosion,	Typanosoma, Trichomonas,
	etc.	Paramecium and Plasmodium
		i. Importance
	(b) Pteridophyta	Liscuss the economic importance of
	i. Morphology and classification	protozoa
0 5	Outline the major alors of	I HUNGI
	Outline the major classes of the	TOPIC I
	pteridophytes and their	uniterificate bus and a later to
	characteristics Classify the	i. Morphology and classification
		COMMITTED TO THE CONTRACT OF T

I I manifelombrates us to the short is level 1		10	P55177	The second second
outline the majoupcharacteristics//oker			NIMALIA	V     0
the individual classes with reference	DNIGERIAN	ETWORK.COM		
to representative species, e.g. the club	Students	o should?	ulline the major	
mosses to a Colonius III the forms	sallagt an	dalaber ful	vertebrates and	mi
(e.g. Nephrolepis, Dryopteris, etc.).	specimens	enorces and	iscuss their major diff	all
Discuss alternation of generations.	pteridophy	tes	THE TOTALISTICS	113
emphasizing the dominance of the		(formerly	ZZR ABRAZISE	g)
sporophyte and senarate existence of	•		elenterata)	
WO generations at maturity		sification	Morphology and class	
1 - Singht heterochard hands to be	Student	of enidaria	thine the major classes	
1 Simulatice. Highlight like city had	Students	off should	Relevantamenta went of	5 (34)
which contributed to the success of pteridophytes as land plants	examine	andel drawe	especimens ensofili	
ii. Importance	specimens	to offurthe	Spermatophytes on it	
1 1 0 11	pteridophy	ytės gansasi	classes, with re	757
Outline economic/ecological importance of the pteridophytes,			esentative species su ( <i>Helia.</i>	ons
I metuding their possible bests :- 1	Student	idgildgiH	em. emorphism. Discuss	: 1 1
	examine		as/increase in com	
1 10 24	specime		el of organization of c	
	cnidaria	es emmani	ctor in evolution	a a
i. Morphology and classification			importance	
Outline "the major classes of		/ecological	hlight the economic	
Spermatophyta and their			s of enidarians in the	
characteristics. Classify the			marine food chains, c	
spermatophytes up to generic level.				
Comparatively study the major		7	Platy helminthes	(d)
characteristics of gymnosperms and	Students	fication	and the second s	1 1
angiosperms: Mention extinct orders			ine the major classes o	
of the gymnosperms Discuss the	Students			
range of forms! (trees, shrubs, herbs)	LeoHedt	classify and	sify the Platy helmin	Clas
in angiosperms with regards to their	draw sr	ecimens of	generic level. Outline	the
adaptations to habitats (aquatic and	gymnosr	erms and	nostic characteristi s	diag
terrestrial). Discuss the diagnostic	angiospe		es, with refere	clais
terrestriary. Discuss the diagnostic	monocol	s and dicots	sentative species	repre
vegetative and reproductive features	various	groups 910	ia, solium, Fasciou <b>n</b>	Farm
I III IIIOIIOCOUS and Gibbs	Wichtera	s adapted t	o gyrodactylus/ o	Macer
Telefence to representant of	0.15 CO C. 15-C.	habitate	dactylus/Planaria	Grind
gymnosperms (e.g. Pinus) and angiosperms (e.g. any followering	aniser:	naortats natroni\a	ss the range of form	Discu
angiosperms (e.g. any flowering	aprenner	to leve	complexity and le	ai l
plant).	platyheln		zation as a factor in ev	
Highlight the development of the		110133140	oportance	ni lii
seed habit and its significance.			ght the economic/rned	ildbill
Emphasize the dominance of the		ical roles	yhelminthes	of mar
Emphasize the dominance of the			2501111111111111	IBI IO
sporophyte and progressive increase				-1
in its complexity	1			
iv Importance				
Discuss the economic/ecological				7
roles of spermatophytes as dominant	1			e'
roles of spermatophytes as a serial food	1			
land flora, which provide food,	1			
shelter, clothing, energy, etc. to	1			
Comment of the commen	29			

):	TOPICS AND GONDENESSWWW		INSTRUCTIONAL	
	The state of the s	PRACTICAL	MATERIALS	
+	(c) Nematoda	GUIDE		
	i. Morphology and classification			
	Outline the major classes of the	A		
	nematodes, and the characteristics	Students should	Relevant	1
1	of the phylum. Chassify the	collect and classify	fresh/preserved	1
	nematodes up to the generic level.	Nematode	specimens of	
١	Outline the major diagnostic	specimens	Nematodes	
	characteristics of the classes, with		ozalioni	
	reference to representative species,	1	+ ]	
1	such as Ascaris, Trichinella,		author entert at	
	Necator, Onchocerca	· flux, Magray	Cortine the counces	
	Discuss the range of forms/increase	Students should	i at to some it	•
	in complexity and level of	examine and draw	Total Toy Control Mon	
	organization as a factor in	nematodes	of a manual greens	-
	evolution	specimens	in the state of the authority	1 .
- 1	ii. Importance	Spootmons	Lite anick	
	Highlight the economic/medical		N	The state of the s
	roles of nematodes(e.g in soil & as		. Ablign gritz (ft)	
	parasites of plants, animals,			
	including man)	n a attent	Phy golodopal/	
1		100	o man in dian	
ř	(d) Annelida	Mark Harte	Can Canton	,
	i. Morphology and classification	200	pout diser	
1	Outline the major classes of	The state of the	of the second	. ,
	annelids, and discuss their	(1) (1) (1) (1) (1)	Relevant fresh/	
	characteristics. Classify the	1 725 70	preserved	,
	annelids up to the generic level.	Students should	specimens of	
	Outline major diagnostic	collect and classify	Annelids	
	characteristics of the classes, with	annelid specimens	of the second	
	reference to		fig. 1 DCS/H11	
-		- skraponi h	o digital recollecti	
I,	opiosolitati.	man and a second of the second	a - Program Western	,
1	Lumbricus, Nereis and Hirudo.	1 - 12.55014 17	1 1 2 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
_	Discuss the range of forms/increase	AT COLUMN STREET	U.A. 114 900	
	ii complexity and ions	Students should	a sair i and	
C	ngamzanon as a races	observe and draw		
e	evolution. Highlight metameric	specimens of		
	segmentation, true coelom	annelids	Strand Miller of the	1
i	i. Importance	annellus		
F	Highlight the economic/ecological	return typerater inc	acultons assuração	
Т	oles of annelids (e.g. in the soil,	de mail to	pil movember becker	1
r	narine and freshwater ecosystems)	liscol acum	ार्थ - चेच्च का व्यक्ता	
		or bundler		
(	e) Mollusca		cionell co	
. (	-/ 11201145		pay conti	
	i. Morphology and classification	' écological /	managas att a 120 m	
10	Outline the major classes of the		of the field of the second	
	nollusca and their characteristics.	and a second of the second of		

to the	PF A	SINGL	TOPICS AND COM	7
Classify, the mollusca up to the generic level. Outline major diagnostic characteristics of the classes, with reference to species, such as	a gg	,	Relevant	SINO
generic level Outhor Deligation	WWW.REA	DNIGERIANETWOR	K.COM, fresh/preserved	
diagnostic characteristics of the	Commence of the second	and the second s	specimens of the specimens	-
classes, with reference		nobsoffizza	Mölluses orgrow	
representative specially	6.442	Ship 21 the	and the major of	
snails, clams/bivalves, Octopus outline features of evolutionary significance such as advanced significance of presence of	Student	s Should	nematodes, and the ci	
Outline features of Vidayanced	collect	and classify	nemacocon divium.	
significance such as advantage of coelom, cephalization, presence of Mention fossil	Ollahined	a specimens	of the phylum. ( nematodes up to the g	
coelom, cephalization, presence of gills, shells, etc. Mention fossil	Moody	diamonib	Outline the major	
gills, shells, etc.		July 2422013	characteristics of the	
molluscs	late.	animers avil	eference to represent	
	100	TrichingHa	second as Ascaris,	
ii. Importance		7777.355777.357.1	Necaror, Onchocerca	
Outline the economic/ecological		Transfer Marca	Wernion, Commercial	
significance of molluses (e.g. as	Studen	osnoioni vani	Discuss the range of fo	
intermediate hosts of disease	Students	should	in complexity and	
causing organisms, food, source of	observe	and draw	n en uourzum510	13
ornaments, roles in aquatic food	Mollusc	specimens	evolution	
chains, etc.)		•	evolution ii. Importance Highlight the reco	
1				
(f) Arthropoda			roles of nematodes(x.s	4 /
de la localification		s. animals,	parasites of plant	
i. Morphology and classification			including man)	
Outline the major classes of the				
arthropods and their characteristics.			abilannA (b)	2
Classify the arthropods up to the		assification	i. Morphology and	
generic level. Outline major	. < /		Outline the major	
diagnostic characteristics of the classes, with reference to		_	annelids, and di	1
classes, with reference to			characteristics. (	
representative species, such as	Sunder		annelids up to the	
spiders, scorpions, millipedes,	collec	*		1 1
cenupedes, craynsh, crabs, and	1		Outline major	
miscers from different orders.	Maine 1	ciasses, with	RelevantusionaleR	
Highlight complete and incomplete			fresh/preserved	
metamorphosis using examples	Students	should	specimens	
such as mosquitoes/housefly,			Arthropods	
cockroach /grasshopper,	arthropo	de stonikanto	Discuss the range of \	
butterfly/bee.	1	o level t	in complexity an	1 1
Highlight features of evolutionary	1   Smdc	Hacior II	2 21 maiterianna	
significance, such as reduction of	ipsulo 5	n metameric	evolution Highlip	
the coelom, development of 41011	Students	rivile	on sunt	
neart and mal will			segmentation, true co	
structures molting and	observe	and draw	ii. Importance:	
l and City	arthropo	gz somo sayani	Highlight the Econo	1 1
		in the son	oles of annelids (e.	
arthropods Factor lossil		r ccosystems)	marine and freshwate	
success of insects			The second second	
II. Importance				
Outline the economic			aralloká (a)	. 1
Outline the economic / ecological / medical significance of arthropodsed	1	iong me		
arthropodsed B	YSWWWREA	DNIGERIANETWOR	Relevant fresh	/
Department of the second	~ taurme	ontracel Production		

			of [	- A STATE OF THE S	
	(g) Chordata	collect and classify	specimens of		
	i. Morphology	chordates	Chordates		
	i. Morphology and classification Outline the major of	Security of the Administration	property and an extension of the		3
	chordata and their classes of the	rectacl the property	of mateliar of partners.		1
<u> </u>	Classify characteristics.	2 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	mwide -		
-	Classify chordata up to the generic level. Outline major to	tone mounts to	survinus bro copy I		and p
	level. Outline major diagnostic features of the	tenerios of	hou to out topowers		j
	features of the classes, with	Nit registed a	each dank. Detregance		
		and the second s	budgid of bleeds out		
	auta (Ralance)	31/1/2 2			
	and urochordata (e.g. sea	Production strains	there is not be a second		
	squirts/tunicates only	The file of the second	THE SECURE STATES		
	(e.g. Amphioxus) and vertebrata	Students should	100000 15 1 · 自然等于,		
	(e.g. fishes, frogs/toads	observe and draw	· 注: 4月代的表现在 了20日		
	lizards/snakes bind	chordates			
	lizards/snakes, birds and mammals)	1424 totopor	1 15 year (42 )		
		1300 C	toods		
	Highlight features of evolutionary	of the later of	100 M		
and the same of th	organicalice III the various 1	200 <sub>0</sub> 30	ms)?	,	
	Stoups. Diffilly discuse the notice		tao.l		
1	of Amphibia as the first terrestrial	e and the above her	In the land of the	7	
1	vertebrates, and the various	a will contain	SI SHOWN SHOW AND		
	adaptations for life on land		Lines and the second		
1	i and for fite on land		Store and a second		
	ii. Importance		SAPARA A CHARLETTE IS		
	Outling the	The season of the	MARIE FOOR LEBERARDING		
	Outline the economic / ecological /		303000	, A	
1	medical importance of the chordate				
1					
			Franks Moderney		
		perper 8	capital and a company for	1	
	17 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	t	super artists as		
			nutativ reservit		
		politic of a region	the attendance in		
	LESS 1 1	1 2 m . 3 1 "	bni.		
į.	SECTION C: FORM AND	FUNCTION OF LIV			_
10.	PLANTS	managan da sa	to of attended to a	12	6
	- Classing plants	Named examples of	Tro Priva man as		
	(a) Structures in flowering plants	each should be	1		
			A STATE OF THE STA		
	i. Their morphology	observed and drawn	Describe Alleria sociale		
	- Root	1 12 4 2 3 4	Provide plants with		
	Types of roots, e.g.	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	each type of root,		1
	Types of roots, e.g. pneumatophores, fibrous, stilt, tap	the Visit Day	stem, leaf, flower		
	root, etc. Their distinguishing		and fruit		
1	root, etc. Then distinguishing		modification		
	characteristics related to function.	bus good to	Av a hilly to an east of		
i i	Cham	January March 1	made danker og i		
	Types of stems, e.g. corm, rhizome,		With the same of the		
	I Inpli Histing	Logic Conference	Provide relevant		
	runner, etc. Their distinguished characteristics related to function	0 7 0			
	characteristics letates	Diagram			
	- Leaves arrangement and	dicot flower	Tolovalit wall charts	7/8	1

modifications to suit habitat. Dicot and monocot leaf shape and structure in relation to function

- Flower Types and structure of dicot and monocot flower and function of each part. Differences between the two should be highlighted.

- Fruits Types of fruits and placentation; dispersal seed and Fruit mechanisms.

- Anatomy of monocot and ii. dicot:
  - Root
  - Stem
  - Leaf

General arrangement of tissues in the three organs in relation to ecological function and should environment (leaf) discussed. Root hair structure and function

#### (b) Nutrition in Plants

- i. Types of Nutrition
- Autotrophic photosynthesis and

chemosynthesis Requirements and the process of photosynthesis. Dark and light reactions with cycles drawn to illustrate them. (No need for the biochemical details of substances named). Final products and their significance should be discussed. An outline of chemosynthesis with examples

-Holozoic/ Heterotrophic Mention cf plants which trap and digest insects, their habitats and designs, e.g. Venus fly trap

- Mineral requirements of plants Their sources including chemical fertilizer compositions, roles and deficiency symptoms

examples. Floral and diagram formula should be introduced.

of Specimens various fruit types should be dissected T.S.) (L.S. and observed and drawn

Slides of T.S. and L.S. of the three organs.

Provide materials experimental for set-ups

during teaching

Growth of maize seedling in dark and light to demonstrate etiolation. Measurement

of photosynthesis in leaf disks

Provide materials for experimental set-ups

Provide materials for experimental set-ups. Refer relevant wall charts during teaching

Provide materials for experimental set-ups. Refer relevant wall charts

				$\neg \neg$	
F. F. Sandarova I.	- Transport Systems		during teaching		
	Explain need for transport	and the second of the second of			
	due to increase in size and change	G il wimonts	Marie menadi		-
	in habitat. Importance of the	Growth experiments	a blance areastrated to		
	following processes	to show deficiency	POTENTIAL MANAGEMENT		
	composition, structure and function	symptoms	outraile comment		1
	should be stressed	the Breat Court of		1	
	- Water relations	diet. is bon busily	. I was in some		
	Evnlain com	100 St 210			
	Suction and To Osmotic,	(B)(10), -	Provide materials		
	plasmolysis (as	Statement of Character	for experimental		
	plasmolysis (see section A 2a)	which are the	set-ups. Refer to		
	- Transport in Xylem	रकतार है राजनीति कि व	relevant wall charts		
	Movement of water and dissolved	miding.	during teaching	4 60	11
1 4 6	mineral salts from soil through root		2017	-	1
	itali to Aylem vessel and ascent of	Test T			20
5	sap together with diagrams	Experiments to	union of the mile to		
	- Transport in Phloem	demonstrate each	Local A		
	Movement of synthesized food	biggiai	SALV Zastlere de a		
	from leaves to other parts of plants	e man hi may be -	Trouble aconomic		
	active transport, effect of ringing	Experiments to	Provide materials		
	should be explained	demonstrate effect	e.g. for		
	- Transpiration	of changing light	5.B.		
	Process and factors affecting	intensity,	ups. Refer to		
	transpiration				. A
		temperature, wind,	relevant wall charts		
	(c) Respiration	measurement of	during teaching		1 2
	(c) Acspiration	transpiration rates			
	i Vantilation atmost	by loss of weight			
	i. Ventilation structures	method/cobalt	Provide materials		
	Stomata apparatus, lenticels.	chloride paper,	e.g. for		
	Mechanism of gaseous exchange	photometer	experimental set-		1 7
	and utilization of end products	The state of the s	ups. Refer to		2 71
	ii. Aerobic and Anaerobic		relevant wall charts		
	respiration	observation to take	during teaching		
	Definitions, equations and	12 – 48 hours	APTRACTOR STATE		
	examples and uses. Differences	559 1117 11	aur i gada . Pastada		
	between aerobic and anaerobic	To Mary 4 to	way the transmission of		
	respiration.		(8)		
	A Copping		;		
	(I) Derveduction		mark of a		
	(d) Reproduction	Diagrams of named	the total and the	1	
	General outlines of Sexual and	examples mount	1 1	i	
	Asexual reproduction in plants.	and observe pollen		1	
	1 2			1	
		from wind and			
	1	animal pollinated			1
	1	flowers to show	the lates and the state of the		
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	difference	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1	
	(e) Plant growth and development	1,46	Provide relevant		
	Various definitions of growth	1 Turiles		1	
	Various definitions of growth		Refer to wall charts,		1
	should be stated. Rate, pattern and		etc. during teaching		
	stages of growth with explanation	.			

			was all an experience	
	of sigmoid curve. Various methods of measurement of growth. Meristems should be introduced. Germination, types with named examples. Conditions necessary for growth, light, temperature and mineral requirements, etc. Plant growth substances (auxins, gibberellins, cytokinins, ethylene as inhibitors and promoters). Their location, movement and effects should be mentioned	Grow maize and measure growth. Observe L.S. Onion root tip as e.g. of meristem  Grow Amaranthus / Bryophyllum and show lateral bud inhibition	Provide materials for experimental set-ups. Refer to relevant wall charts during teaching	Ö
11.	ANIMALS  (a) Nutrition in animals  i. Food substances: carbohydrates, proteins, lipids, vitamins, mineral salts and water. Nutritional deficiencies. Brief mentioning of the component of animal and plant carbohydrates, their sources, roles and function. Sources and functions of vitamins, mineral salts, and water  ii. Lutritional types in animal Discuss and give examples of Heterotropic: Holozoic, Parasitic and Saprophytic. Briefly mention subtypes  iii. Structure of teeth Herbivores, carnivores and omnivores, dental formular of each,	Test for starch, reducing sugar, protein, fats and oil.  Compare digestive systems of Reptile or Amphibian, bird and that of a mammal indicating their differences and similarities  Histology and functions of various sections of the digestive tract, including liver and pancreas	Provide relevant slides  Provide relevant models/ wall charts	6
	omnivores, dental formular of each, and their specialization to types of diet  iv. Digestion Organs associated with digestion, absorption and assimilation of digested food in animals. Mention digestive enzymes, and their functions  v. Histology and function of deuodenum, stomach, small and large intestines and liver Structure and functions of different parts of alimentary canal should be highlighted	Examine and draw slides of composition of blood, arteries,		

(b) Transport	in	vertebrates.
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Mention the need for transportation i. Structure and function of the mammalian heart and major blood vessels. Mention the structure and functions main arteries. capillaries and veins, and their differences. General pattern of blood vessels to be treated briefly for understanding of transport of materials between blood tissues. Mention names of blood vessels. heart diseases/ arteriosclerosis. Transportation of materials such as excretory products, gases, digested food and nutrients should be treated briefly

#### (c) Respiration in vertebrates:

i. Ventilating structures
General characteristics of respiratory surfaces. Mechanism of gaseous exchange in fish, toad and mammal should be explained, including body surface, cutaneous, gills and lungs as ventilating structures. Mention importance of mouth-to-mouth resuscitation and the use of ventilators. Muscular depletion of oxygen during heavy exercise

## (d) Excretion in animals

Discuss need for excretion

i. Excretory organs Discuss the kidney (including the nephron), liver, lungs and skin, function, structure, their out carrying mechanisms of and their excretory functions products. Emphasize regulation of environment by skin. Mention conditions that affect function of the kidney, e.g. water and salt content of blood, and

veins, capillaties	AND THE PERSON AND ADDRESS OF THE PERSON ADDRESS OF	NA south	
and heart tissues.	istagainm and		
Dissect a mammal;	victoria animate.	1 - 4	
	As a countrie received	1 9	
expose the			
circulatory system	Provide relevant		
and draw.	specimens for		1
	dissection that the		
1 to white in	a. Franklagerstedel		
	ands area and objects		
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red a reserve	Lan. (wine-ingl)		1 1:
Examine and draw	attach magabi		
the respiratory			
structures of fish	Loninia in ininia		
toad and maininal	o skiedo y utocze i paparent i termini		
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63.			
BODO	Mechanism of Locus		
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	Mention types and h.		4 4
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	Stenus impuration		
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	to the sale and may be	T)	
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Examine and draw	, 24		
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mammalian kidney	, i	4	
skin and liver	Take not a more sky o	1	
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	environmental temperature.	Land to	Provide relevant
	Mention types and causes of		models/ wall charts
		The second secon	v, i,v it intokši,
	disease of kidney, liver and skin		
	1 T 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
	ii. Osmoregulation and excretion,	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	3. 10.
	and their relationship	5 / 5/97	
. 4	Osmoregulation in freshwater,		
	marine and terrestrial environment,	Individual bones of	Provide relevant
	and give specific examples, e.g.	the mammalian	1101,00
	Tilapia (in freshwater), dog fish (in	skeletal system	models/wall charts
		should be	The second section of the second section of the second sec
i i	marine) and humans (in terrestrial)	emphasized	100 Colonial
		Cimpilasized	to march the cold to the
	(e) Support and locomotion in	•   • • • • • • • • • • • • • • • • • •	
•	animals:	124.74(; -1)	The same of the sa
i i		a language state	
	Definition and reasons for		
	locomotion, function of skeleton,	ye in lour bor	The second secon
	the skeleton and supporting	gg . dig'et at	A STATE OF THE STATE OF
	systems in animals. Candidates	<b>8</b> 1	
	should be familiar with the general		7 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -
	plan of mammalian skeleton and		
	different types of joints		and the North Action of the Ac
	different types of joints		arregion competition in
	CTion		3 7 3 7 7 11 192 3 1 1 1 K
	Mechanism of Locomotion		2
	_		
	- In water		
	Amoeboid, ciliate flagellate, and	, 'm .'' - 1 - '	1317 13 200 2001
	swimming, different types of	80 13 11 11 1	
	swimming as found in fish.		
	Mention types and functions of fins		
	- On land	'v 3 102 ' •	Section 1997 (1) A Self (1)
	Leaping, looping, hopping,	n had hersel cause	gizo to which the
	crawling and walking in tetrapods.	·	DM MEN A
	Mention importance of muscles and	·	
1	the main muscles responsible for	2 164	ans as notions and (b)
	locomotion, and how locomotion is	*	
	achieved by muscles and skeleton	× 15071	La carrie processor action to the
	- In air	y 10.774 V	
	Treatment of flight in insects and	Observe slides of	
	birds. Brief mention of muscles	sections of the	Provide relevant
			The state of the s
	responsible for flight in insects and	mammalian testis	permanent slides.
	birds .	and ovary. Dissect a	Provide suitable
		small mammal to	mammalian
1	(f) Reproduction in Animals:	show the male and	specimens for
7		female urinogenital	dissection
	Sexual and asexual, significance	systems and	HI 1 00 ( 045 . Lil.) 140
.)	and differences between them (e.g.	associated organs	ne situs a sector la
	binary, multiple, sporulation,	18.1	(-78) (-78) (-78) (-78)
	budding, regeneration, conjugation,	6.00	Refer to relevant
	etc.)		
4	1/	L	models/ wall charts

- i. Formation of gametes
  Discuss methods of ensuring
  fertilization; sexual dimorphism
  and sexual display/behaviour
  relating to ensuring fertilization
  process
- ii. Male and female reproductive systems in higher vertebrates Mention their differences; histology of testis and ovary, structure of sperm and ovum
- iii. Rhythmic cycles in animals
  Brief mention of monoestrous,
  polyestrous and menstrous cycles
  (e.g. fox, dogs, rabbits/humans)
- iv. The sexual cycle in mammals Use humans as examples, discuss the need for birth control, mention the dangers involved in early pregnancy and unwanted Brief mention of pregnancy. associated with diseases including sex. unprotected HIV/AIDS. Describe the event of (fertilization), pregnancy, development of embryo and birth. Childhood diseases.
- v. Comparison of reproduction in insects, fish, amphibians, reptiles, birds and mammals Include method of fertilization, number of eggs, complete and metamorphosis, incomplete viviparity, care, parental ovovivipaprity, oviparity in animals should be highlighted, and their relates to significance as it economy of reproduction and survival of the young
- (g) Chemical co-ordination in animals

Pituitary hormone, thyroxin, adrenalin, insulin, gonadal

during teaching

Refer to relevant models/ charts during teaching

Provide relevant models/ charts for exercises

	and print			
hormones, including the secretions, functions, effections	neir site, ct of over	2007/25	is abother	wit zu
and under secretions sl mentioned. Feedback mecl	hould be	Mencant	oda morros a ma Nyang abi dalam	bane ;
(h) Nervous co-ordina animals	ation in	Observe and dra from models of e and ear	ye	princes
Including parts of brain a functions structure and functions spinal chord	and their nction of	ar arth Vacous to	per stamen base Malle nar energy state of b sinds and a sines le yeu	nistaro umalel ilotelal
- Reflex and voluntary action Including reflex arc, and such as blinking of the experience, withdrawal of hand fobjects. Conditioned reflex	actions ye, knee from hot		pendin lon Public	Lar Total Syloq
- The central nervous system - Autonomic nervous system		orapsmak lex disens	barrons as excurg	Usc.
(i) Structure and funct mammalian ear and eye	tion of	And And	production of boose structure and comments book comments	gong.
Describe accommon stereoscopic vision and inverteina; Defects of the eye are correction; Hearing and balance	rsion of nd their	in m Establish E	mancy Brief associated associated associated sets associated as the confliction of the confliction as the confliction of the co	eau 741
SEC	CTION D:	BIOSTATISTICS	Comment of the Comment	750
2. BIOSTATISTICAL VARIABLES	To be		representation (item)	12 0
(a) Measurement Classification of physiological concentration of biological		es are to observe d these attributes of nd plants	Suitable plant a animal population should be used for generating data	ns
fluids, measurements of some optical machinery into continuous variables		ele aligne, m	PROTES INDICATE	øq
(e.g. size height and	C 1: 1 .	그러 가장의 49 - 40 45 함께		
(e.g. size, height and weight) and discontinuous variables, should be outlined and discussed	Candidate and weigh same age g	s to collect height t of students of the group	used as a population for collecting these data	on se
(e.g. size, height and weight) and discontinuous variables, should be	and weigh	t of students of the group	used as a population for collecting thes	on se

		and the same	3723
taste of phenylthio	God in aganona.ca/	Action in the	
carbamide (PTC) and	Giner un sufrantistratif )		
	tel Message et Location or refer ar other con-		
system) should 1	Liebentuck of return mode dura could be used to		
highlighted and explained	and median, simple escuries	All room	
	bou singuist		7
13. DATA COLLECTION	distributes and the state of th	12	6
AND PRESENTATION	baquing him signis garage	12	O.
LESERTATION	as data adaptable to lace		
(a) Data Collection	bring ingel		1
i. Sources of data			
Different	12 Measure of Disposition	)	3
Different sources where	(50 consensation as large,		
data can be collected	second sets to the Az		Many n
should be outlined and	bonsi av lyng vyv losenste		-
explained	Strong to Contract to		1
ii. Methods of data	in the second second		
collection		e en elegado com	-
Methods			1
experimentation,	ND SENIESTER SYLLABUS	1775	Part 1
interviews, questionnaires,	ON E. BASIC MURRINDOGY	The Land	10
etc. and the advantages		A GARAGE	
and disadvantages of each		(Annali Process States 1	energy .
method should be		GIZVE	
discussed	The data collected on		
	heights, weight, etc. could		4.7
(b) Data Presentation	be used to classify and	5. I	1
i. Tabulation	construct frequency tables,		1.5
Classification of data by	Histograms and Pie-charts		
tallying, construction of			1
frequency tables should be	by Vigues and Da area		1
taught. Characteristics of			
frequency table (class size,	192 to examin smedia!	1	
class interval, class limits	plants amovate the set	Ì	
and class mid-point should	tacil sullawy as soft	1	
be outlined and explained	phones smold to as assets.		3
ii. Presentation	libra triuling will		
* Charts	1 10 (100)		
Processes of constructing	(and with a latter and the contract		
	. Chemical Still wing		1
ins as greater,	Isan A tan require to		
	272.00		
frequency polygons should	at make to start		
be taught	divelops.		1.0
* Pie-Charts	politics, yelling, yelling		1
Process of constructing	lever. ann lever		2
pie-chart highlighting how	nation and the		
sections represent different	Like wayne objective		
proportion of data	THE COUNTY OF TH	6	3
14. MEASUREMENT OF	y		1
POPULATION			
PARAMETERS		1 10	

(a) Measure of Location Definition of mean, mode and median, simple formula and basic computation methods using single and grouped as data should be highlighted	Measurements on height and weight or other generated data could be used to for this exercise	C-17, Auroalu gono de gono de contro aconda la contro aconda de contro de co	
(b) Measure of Dispersion The computation of range, standard deviation, standard error and variance should be taught	5399/Fe   \$290/Fe   hone   b	Tall to reconst to a source of the common to	

# SECOND SEMESTER SYLLABUS SECTION E: BASIC MICROBIOLOGY

			251	
S/NO:	TOPICS AND	ACTIVITIES /	INSTRUCTIONAL	SER BER
	CONTENTS	PRACTICAL	MATERIALS	tanti un
	1.11	GUIDE	011	32 1
15.	VIRUSES	and the state of the state of		12
1 1	(a) General	: 10 miles - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	noitemes. C	12
	characteristic of viruses	a propins	ant. I tron.	v 3
1		网络一种人工	safe and much by many	de alim
	(b) Viruses and Diseases		to nousement	
	i. Plant diseases	11. 1	Dofor to	10101
- 1	Mosaic diseases of		Refer to relevant wall	11 10 12 11
- 11	plants, mosaic disease of		charts during teaching	The state of
4	flowers, swollen shoot		dunit west.	isopp.
40	diseases of plants should	<b>*</b>	dhoda	4. 22 10
	be outlined and		the state of the state of	pet of the state of
	explained. Mode of		The state of the s	30 1 30
j 1	transmission and control		HOME HELD	m** . [ ]
1 5	snould be discussed		371	(C)
	II. Human and Animal		Suffering to 2	2500 (4)
(	liseases	,	and the state of t	1209.141.1
F	Role of viruses in		evication of	CZZINO
d	liseases		Munity Ling you	
P	oliomyelitis, vellow	# · · · ·		to a last
	ever, smallney	1-2	Third	
ir	messi-		Sar galan a	
ra	ibles and common cold		wand gaint affigur 1 to	2013
31	louid be Outlined	2	His His man	o seg
	thers such	the state of the s	the state of the s	t solite
H	IV/AIDS SADS			20 01
M	AD-COW and their		1 1 1 1 1	ALL ALL
	then	A Marie Comment	J. Committee and the second se	Maria

And the same of th	mode of the	the second secon
	mode of transmission should be mentioned	
	should be mentioned	recycle of the production that the second
		And the second s
16.	BACTERIA	automatikeed a valetier (1996)
10.		production is an explicit from a first of
	(a) General	18
	characteristics of	
	bacteria	Refer to relevant wall
		charts during teaching
	(b) Bacteria and	Chart sittees in 15, 438
	Diseases	banasarem ad take it
	i. Plant diseases	bonie generalia -
	Blight diseases giving	
	relevant examples	to the state of th
	should be discussed (e.g.	
1	blight of cassava,	i ta canta a Van di
	potatoes)	10 20 10 10 10 10 10 10 10 10 10 10 10 10 10
	ii. Animal diseases	Unit Projection 188
	Pathogenic effects of	
	bacteria on human and	Low array and the state of the
	animals. Relevant	Surface 1
	examples of diseases	Link was a south
1	should be outlined and	the constant of the edition of the constant of
	discussed, with	of Lincoln and the state of
	emphasis on sexually transmitted diseases	negleater T district
	transmitted diseases	23 101 01 462 0
	(c) Uses of Bacteria	The state of the s
	i. Agriculture	or black w this bi
	Role of bacteria in	201 91112 0
	decaying of organic	Harris R version
	compounds,	The company of the co
	Nitrification of proteins	fight a series in
	in dead plants and	and will be to be
A Carrier	animals in soil, Nitrogen	
	fixation and conversion	
	of cow dung and animal	
	wastes should be	land the land to form the land to the land
	outlined and discussed.	
	De-nitrification of	
	nitrates to free nitrogen	- Fo property and it
	ii. Industrial uses	acater as Alth
	- Food	minus molary (1986)
	Dipening of cheese,	gradients and Test
	granging of foods,	Landar Var.
	Garage Curdling	(3) (3) (4) (4) (4)
	of milk should be	and the same of th
44	01	
	discussed - Manufacture	
	- Manuractur	37

With the course	
Curing and ripening of	The second secon
tobacco and tea leaves;	the total and the of the
fermentation of leaves,	La Land cannot of our rie !
retting of fibres, tanning,	
and formation of vinegar	
from alcohol should be	16 B.CTECIA
discussed	
	la (san-sa)
iii. Sanitation	NO PARTITION OF THE PAR
	Service of the servic
sewage in septic tanks	bus sometimes of the
should be mentioned	
and explained	
	5.21/18 (2.4.48)
iv. Medical uses of	
bacteria	
Bacteria as sources of	the state of the s
antibiotics. Names of	
the bacteria and	
antibiotics should be	
outlined and discussed.	10
The role of bacteria in	to a sum of the second
the control of	ABLVSON V SERVE L
putrefactive and	(4) Min. Rev. v (C) 1 (2)
pathogenic bacteria in	See Adopting to the contract of the contract o
the intestine should be	
mentioned. Production	f that we want to the first
of cellulobiose for the	29/05/20 Jen aug am
digestion of cellulose in	in the second in
ruminants should be	5. 060.200
highlighted	10. July 4 4
	January I.
v. Research	
The use of bacteria in	* * * * * * * * * * * * * * * * * * *
biotechnological	in the state of th
research should be	
highlighted (e.g. single	
cell proteins – SCP)	
	e de l'agrant a risale de la
(d) Control of bacterial	So Cantons proju
	frazzon eta birra di pidin y a
activity	its transpirit I
11/2	(CBOD : 1 953) A
- Food preservation	
Methods, e.g. salting,	stea linera por
freezing, drying,	1 e z
Pasteurization, canning,	10 2 Page 17
smoking, etc. should be	industrate to superior
outlined and discussed	parebrus war a sail w
	id bings 3 r
- Sanitation	
Use of antiseptics	54 · 1 · 1 (4 · 2 · )

	should be 1: 10	The state of the s			
	should be highlighted	t in In other	HIQPM: 1	M. W.	41
		0.000,000,000	SEE Short or blands		
		of the same of the	District Street Against 1	A 174	
17.	FUNGI		mindry 182,880 193		
	(a) General	35.1163	Hier hopovamaniem	12	-
	characteristics of fungi	1	arned on	3 7 7	
	(b) Importance of Fungi		ulcosa , flatures , seeclu		
	i. Food processing		tootta cata	Light (	14
	Source of food, e.g.		with the sa	Taken l	
	mushroom, vitamin B		200	. Suc. of	
	and use of yeast in				
	baking should be		lasins	5 1	
	mentioned		Lar		*
	ii. Industrial uses		olomes a pi s		
	Fermentation for		ed bloods on	to Chiri	
	production of alcohol			bassi	Ie.
	should be mentioned				
	iii. Medical uses		my No. m. Sonoi	. 8	1
	Outline their roles as		e dynasones e	they go	1)
	sources of antibiotics,		(2000)	mling	er)
	giving examples		should also ly	EN195	7
	iv. Agricultural		if fluctors to i	200	9-1
	Fungi as decomposers			73-161	V**C   V
A.	be discussed		mmagandi n	149.3	
	v. Plant and animal		arcutelizati and	100000000000000000000000000000000000000	la l
	diseases		L. MERHERY HA		
	Diseases like potato	at the second	251000000 300 31	to professional and a second	1
	blight, smut of maize		700 14	ii del	20 8
	and wheat, rust of		moleven - liga	AT I	
	sugarcane, mildew of		integer of	The Late	Maria III
	grapes, athletes foot,	iones Prop.		indo .	
	ringworm, candidiases,	regree two mas I	of the continuous lands in	)	4
	etc. should be	D.1370 o	none High	1518	A/ 1
	highlighted	TOTAL TIME	and the second s	<del>,</del> .	
N. C.		SECTION F: ECC	JLUG I	3.000	7
18.	BASIC ECOLOGICAL	Candidates	Fieldwork	12	9
	CONCEPTS	should also	TICIONOLK	12	(including
		undertake a	although als	JY, B	field work)
	Niche, habitats and	guided detailed	y a mala, as have	1 rob	Hold Work)
	macro-habitats, species,	field study of	hand were bare well	blue	
	population, community,	simple	senial beauty	P STA	- \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
	ecosystem, biome and	ecological	areas de to	Parties.	1 5
	biosphere	communities,	1 (1) (1) (1) (1) (1) (1) (1) (1) (1) (1	1000	a l
	1	such as a road-			
		side pond or a	7507 60 82	iv of	1 15
		small garden	Provide field	12	6 .
19.	THE ENVIRONMENT	Candidates	-t 2 - 1 - 1	3.	0 .
19.	7.9	should study	The second state of the second	10813	
de la companya de la	- Biotic and abiotic	how some	fieldwork		
10.4	4 Blotte and 42	1)20			

		т.		- K	get with the to	
	factors	abiotic factors	heart of this	- Width		
	Mention should be made	are measured				
	of how various biotic	using appropriate				
	(e.g. parasites,	equipment, e.g.				
	predators, etc.) and	thermometers,	and the same of th	11 12		
	abiotic environmental	rain gauge,	forest/			
	factors (e.g.	barometer,	Fried W. Parent	91 4.1.1		
	temperature, rainfall,	secchi disc, etc.	in the same	101 - F		
	humidity, etc.) affect		manage vita	11000		
	organisms and their		3	61.11		
*	populations		9.0		121	Y
	populations		94 HHURT		72.0	
	Factorical		769 TABBE 17	7 5		
	- Ecological Succession and		i of blooms	3		
	240000		1			
	dominance in a simple		spen i uses			4
A	community should be		ncel of the			4
A.	studied		Televier 1 🤫	. 10 15	11	
			18/70 18 18/10	1 6 10		
	- Balance in nature					* 1
	(i.e. the dynamics of	+ :		9.1		
	populations)	,	7.20 mil. 1			
	Mention should also be		cally true	5-505		
	made of factors (e.g.		7 July 20	, X		
	natality, competition,		l nov immit id	, ,	j	
1	mortality, immigration,					
	emigration, predation,		longin here in			
	etc.) that maintain a		I I I I I I I I I I I I I I I I I I I		21.	
	balance in communities					(
20.	SOIL BIOLOGY			6	3	
1			( ) ( ) ( ) ( ) ( ) ( ) ( ) ( )		1(1)	
1	(a) The soil ecosystem		10 (SH) 11 (SH)			
	- Soil formation		TO WASTER	1 77	22	7
1 1	- Soil profile	Candidates	Provide relevant	4.07	3 ;	
	- Soil temperature,	should carry out	experimental			1
	water and pH	simple	equipment			
-	water and pir	experiments to	- quipinont	1	1	1
1	Simple treatment of soil	determine soil	1 / 1/4			
	Simple treatment of soil	moisture, organic	Level Markey 1 Carl	100	a 5	The second second
10	formation processes,	matter and air		199	0	
grillant.	texture (particle sizes)		1, 1			
(mov )	and profile should be	contents, as well		J.Jul		
	undertaken. Candidates	as porosity and	or the grant of grants or			
	should also study how	capillarity	6. 017 h	THE PART A	111	,
*	environmental factors	T <sub>1</sub> = 1	Total transfer of the second			
	affect soil organisms	. 1 246.00	Description of Street, page 1		1979	
	and soil fertility	d hand	and the second s	1, 2, 1	1 13	
		1 100	XI .	1	<u>.</u>	
21.	THE WEB OF LIFE	1 makes		12	6	
			William A Marine Land of the Control			y
	- Symbiosis	7112	INSTALL OF	11 11		
	Interactions between	Le parties and the second	( 2 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	:		
and the second	BORDER CO. Committee Co. Co. Co.	- A v. A Maria	THE RESERVE OF THE PARTY OF THE	1107	1	

	· · · · · · · · · · · · · · · · · · ·	22.	CO	
human related activities (e.g. overgrazing, deforestation, wild fires, urbanization, etc.) should be mentioned should be mentioned Air and water pollution Knowledge of sources of pollutants will be required of candidates. Candidates should also be able to list specific pollutants radioactive materials radioactive materials carbon IV oxide, crude carbon IV oxide, crude	Ecological consequences of traditional and modern agriculture should be discussed; advantages and disadvantages of each system (e.g. monoculture and plant diseases, chemical fertilizers and pollution, and loss of biological diversity, etc.) and other	HUMANS AND THE ENVIRONMENT  - Agriculture	- Ecological pyramids Candidates should be able to draw common food chains or webs, and construct ecological pyramids of numbers, biomass and energy for simplified communities	and among organisms (e.g. parasitism, commensalisms, predation, mutualism, co-operation, etc.) should be highlighted - Food chains and food webs
		To the property of the propert	Management of the second secon	
		12 6		
		8		

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,	[CFCs], etc.) their	A STATE OF THE STA		
	effects and how they can		401 19 - 1 - 2 - 2	
	be controlled. Simple		11% xts y.o.	1
1	mention of the problems		1	1
	of global climate		(6)	1
			- Lang	
	change, the greenhouse	,	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
	effect, acid rain, and	}	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
1	ozone layer depletion		about 1 and	
	0		I was the sales to	
ır	- Sewage treatment	4.	and the second	
	and sanitation	1	remarks of the or a the	
	Elementary		han see a no smark	
	consideration of septic		i li smother	
	tank and sewage		windows in the contract	
	treatment systems with		the to your loss as good	
	emphasis on the		Strain to the street of the st	
6	importance of proper			
	sewage disposal. The		HILMAN'S WAY THE	
	importance of the		18 (800) (8) (V (3)	
	recycling of wastes	,		
20	should be outlined		matter out	
23.	APPLIED ECOLOGY		12	6
1	The same of the		Fieldwork Control of the Control of	1
	- Biological control		y condition but, in which is	
	Some common	A 6-14 W.	and to read an other or.	
		A field trip to	di mendi amantagen	
	examples of biological control should be given.	nearby natural reserve should be	to some the	
	Mention should be made		B. T. San	
	of the advantages of		intig an america) by	
1	biological control over		form them in an in-	
	conventional chemical			
- 1	control of pests		Gargo and to get us	
	control of pests	j.	while the explicit of the first	
	- Conservation of	i	Patrice a temptor manner	
	nature (biodiversity)		(6 3	ţ .
	nature (elections)		difference will the	
	The importance of wise		and the same threater	
5	(sustainable) use of	1	stouth remembered	,
	renewable natural		TOLLW BLA MA	
	resources (i.e. wildlife	1.	armitting	
	and fisheries, water,		assum to sub-linear	
	forests, etc.) should be		the two wide income	t. ii
*// -	emphasized. Some		to considering the property	
	techniques widely		Ada birana cala	
	employed to achieve		all sees with a line of	
	conservation (e.g.	<u> </u>	1-3-20	
	creation of nature	,	. jednokaj"	100
	reserves, legislation,		a super site is the second	
desired and the second	etc.) should be discussed		West of the same of the same	
100	The state of the s		THE TEN A HILL OF THE PERSON AS	

		The second secon	And the second second
		the same of the sa	
- Integrated pest		I have been by a get 1 We	4
management (IPM)		the same and said to the	1.0
Highlight the principles		described Attack	
of IPM as a systematic approach involving		Chicart bar salani,	
l i i i i i i i i i i i i i i i i i i i		The state of the s	
biological, chemical,	1 . !!	1 lotinicus d'hakalee	
physical, etc. means of pest	, the state of the	nitro bur root altises a	
pest control management	1	20 to 120 to 120 to 1	
SECTION G: GENETICS	1		
24. HEREDITY		mean and Arm	
Definition of terms in	7	CONSTRUCT NO. 110 - 11 18 -	9
genetics, heredity and	1	j sitt til somminggler er bå	•
		Dos, Africky Topics to the	
, ,	•		2
	1	the region harder of the	A.
homozygous, heterozygous,		um set 2504. 15 tr 🏩	
		( rate and a four care)	*
homologous, dominant, recessive, monohybrid		20/20/20	2
	•	1 (1) (1) (1) (1) (1) (1) (1) (1) (1) (1	p.3
cross/ratio, dihybrid	1	LANGUAGO A CAMBINA	
cross/ratio, Test		Cod (C) - Cu (1	į.
cross/back cross,		Harry Hr. Cychis	- 1
codominance, allele		11/01/2 1/0	
(allelomorphs), lethal			4 5
genes, linkage, crossing		Joseph District of Granders	
over, sex-linkage,		0.324	4
polyploid, clonings,		d 2	
genetic engineering,		denda direct	1
locus, traits, etc.		- CE	1
		4.5	
(a) Mendel's work –		Sie en Paris	
inheritance of characters		a and element fine of a CMS of a	
General treatment of		THE	}
Mendelian principles	100 2 100	and titled and take.	
and their deviations.	111 000	The last of the District of	
		relies a signer	
(b) The Mechanisms of	I I I I I I I I I I I I I I I I I I I	ykosiikaa l	5)
inheritance		a long to be less than the	2.1
i. Chromosome and	1 7/37/	and the second of the second	g 1800 - 400 - 1
gene Theory O	587		
inheritance	doce		
A connection between	1	Students should be	
the Mendelian laws o	f		
inheritance and the	e l	exposed to charts. Use	
behaviour of the nucleu		of models, e.g. beaded	
behaviour of the fuelou		chain to illustrate	
in cell divisions, i.e	s l	chromosomes	
ПППОЗІЗ		A de marie	
I should be use-			
explain the theory of	1	•	

Ì	mneritance. Simple					· · · · · · · · · · · · · · · · · · ·	<b>化解读</b>
	treatment of nature and	and a second like the second			1		
	structure of genes and			teen contain			
	DNA as the basis of			15	,		
	inheritance	;		560 5 45 7 1 1 1			
	ii. Linkage and crossing			College College College	4 1 1 1		and the second
	over			gardons re	1.4 [1 1] 1.4		
į	Definition of linkage,			learne to tax	1271,710		
- 1	crossing over and their			to vincini 😁 f	100		
	importance			forhird	1		
				10.310	Libert of		
	(c) Mutation					11 1 1	
	- Definition of mutation				The state of		
	and its importance in the	\ - 		us Arts	and a strike		1
	evolution of plants and			batt control of	1 1111	<b>♦</b>	
	animals			33.79fg			
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	examples of convergent					

and divergent evolution. The link between evolution and variation should be established. Key steps in the evolution of humans should be mentioned	
- Natural selection and speciation  An overview of the concepts of natural selection and mechanisms for speciation (i.e. roles of mutation and genetic drift, etc.) as the driving force for evolution	

## Recommended Texts / Reference Materials:

Basic Recommended Textbooks:

Α.

- 1. Taylor, D.J.; Green, N.P.O. and Stout, G.W. (1997): Biological Science (3<sup>rd</sup> Edition). Cambridge University Press, 984 pp.
- 2. Keeton, W.T. and Gould, J.L. (1986): Biological Science (4<sup>th</sup> Edition). W.W. Norton and Co., New York, London, 1175 pp.
- 3. Roberts, M.B.V. (1980): Biology: A Functional Approach (2<sup>nd</sup> Edition). Thomas Nelson and Sons Ltd., 637 pp.
- 4. Sokal, R.R. and Rohlf, J.F. (1973): Biometry. W.H. Freeman and Co., San Francisco.
- Dutta, A.C. (1979): Botany for Degree Students (5<sup>th</sup> Edition). McGraw-Hill Inc., 909 pp.
- 6. Kershaw, D.R. (1988): Animal Diversity. Chapman and Hall, 428 pp.

- 7. Bibby, C. (1964): Simple Experiments in Biology (2<sup>nd</sup> Edition). Heinemann Educational Books Ltd., London, 216 pp.
- 8. Jepson, M. (1942): Biological Drawings (With Notes) (Parts I and II) 5<sup>th</sup>Edition. John Murray Ltd., 60 pp.
  - 9. Rowett, H.G.Q. (1962): Guide to Dissection (1st Edition). John Murray Ltd., 251 pp.
  - 10. Jegede, O.J. (1987): Tropical Biology: A Practical Course (2<sup>nd</sup> Edition). Macmillan Publishers, 154 pp.

#### B. Other Relevant Texts:

- 1. Vines, A.E. and Rees, N. (1972): Plant and Animal Biology Vols land 2 (4<sup>th</sup> Edition).Pittman Press Bath Great Britain (1345pp; 1092pp).
- 2. Sokal, R.R. and Rohlf, J.F. (1969): Introduction to Biostatistics. W.H. Freeman and Co., San Francisco.
  - 3. Singha, P. (1996): An Introductory Text on Biostatistics (2<sup>nd</sup> Edition).
  - 4. Fullick, A. (1994): Advanced Biology. Heinemann Educational Publishers, Halley Const, Jordan Hill, Oxford, 522 pp.
  - 5. Hill, J.B.; Overbolts, L.O.; Popp, H.W. and Grove Jr., A.R. (1960): Botany: A Textbook for Colleges (3<sup>rd</sup> Edition). McGraw-Hill Book Co. Inc., New York, London, 571 pp.
  - 6. Muller, W.H.: Botany: A Functional Approach (4<sup>th</sup> Edition). Collier Macmillan International, 687 pp.
  - 7. Ever, D.W. and Hall, J.B. (1972): Ecological Biology Volumes 1 and 2. Longman, 334 pp, 526 pp.
  - 8. Rost, T.L.; Babour, M.G.; Thornton, R.M.; Weier, T.E. and Stocking, R.C. (1979): Botany: A Brief Introduction to Plant Biology. John Wiley and Sons Inc., 118 pp.

- 9. Bell, P. and Woodcock, C. (1971): The Diversity of Green Plants (2<sup>nd</sup> Edition). Edward Arnold Ltd. (ELBS Edition), 374 pp.
- 10. Ewusie, Y.J. (1980): Elements of Tropical Ecology. Heinemann Educational Book Ltd., 205 pp.
- Barnes, R.D. (1980): Invertebrate Zoology (4<sup>th</sup> Edition). Hong Kong, Holt-Saunders. 1089 pp.
  - 12. Barnes, R.S.K.; Calow, P. and Olive, P.J.W. (1989): The Invertebrates: A New Synthesis. London, Blackwell Scientific Publications, Hong Kong, Holt-Saunders, 582 pp.
  - Buchsbaun, R.; Buchsbaun, M.; Pearse, J. and Pearse, V. (1987): Animals without Backbones (3<sup>rd</sup> Edition). London, The University of Chicago Press, 572 pp.
  - 14. Colbert, E.H. (1969): Evolution of the Vertebrates. John Wiley and Sons Inc., New York.
  - 15. Romer, S.A. and Parsons, T.S. (1977): The Vertebrate Body (5<sup>th</sup> Edition). Philadelphia, W.B. Saunders, 624 pp.
- Webb, J.E.; Wallwork, J.A. and Elgood, J.H. (1978): Guide to Invertebrate Animals (2<sup>nd</sup> Edition). Macmillan Education Ltd., London, 305 pp.
  - 17. Young, J.Z. (1962): The Life of Vertebrates. Oxford University Press, Ely House, London, 820 pp.

## C. Other relevant Practical Guides/Manuals:

- 1. Witham, F.H.; Diaydes, D.F. and Devlin, R.M. (1970): Experiments in Plant Physiology. Van Nostrand Reinbold Co., 245 pp.
- 2. Dunn, A. and Arditti. S. (1968): Experimental Physiology. Holt, Rinehart and Winston, Inc., New York, London, 312 pp.
- 3. Dales, R.P. (1981): Practical Invertebrate Zoology (2<sup>nd</sup> Edition). Blackwell Scientific Publishers, Oxford, London, Boston, 356 pp.

4. Freeman, W.H. and Brucegirdle, B. (1967): An Atlas of Histology (2<sup>nd</sup> Edition). Heinemann Educational Books, London, 140 pp.

NOTE: The list provided above is not exhaustive. Other texts. which cover the relevant topics in great enough detail for 'A' Level Biology (as may be ascertained by the Chief Examiner) can also be used.

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