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From: **Assistant Registrar(PG)** <arpg@unigoa.ac.in>
Date: Wed, Jul 28, 2021 at 2:49 PM
Subject: Agenda Item - BoS in Zoology meeting
To: Joint Registrar (Academic) <jointregacad@unigoa.ac.in>

Sir,

Attached herewith the Agenda Item pertaining to the Minutes of BoS in Zoology meeting held on 16th July 2021 to place before the Academic Council meeting to be held on 30th & 31st July 2021. .

Thanks & Regards
Ashwin Lawande
Assistant Registrar
Academic-PG Depts.,
Goa University.
PH: 8669609021, 8669609065
www.unigoa.ac.in

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6 Attachments • Scanned by Gmail


minutes of BoS 16...


Annexure Ia & Ib....

annexure Ic - UG ...


Annexure IIa.doc

Annexure IIb- PG ...

Annexure IIIa & IIIb.doc
42 KB

Reply Forward

The minutes of the Board of Studies in Zoology meeting.

Part A.

i. Recommendations regarding courses of study in the subject or group of subjects at the undergraduate level:

- BoS approved and recommend some minor changes in some courses of SYBSc (ZOC-103, ZOC 104) and TYBSc (ZOC 105, ZOC 108 and ZOC 110 ZOS 104) syllabus from 2021-22 academic year.

- BoS identify some courses for credit mobility / add on course of some MOOCs through SWAYAM /NPTEL portal for the FY/SY/TY students for the academic year 2021-22.

ii. Recommendations regarding courses of study in the subject or group of subjects at the postgraduate level:

- BoS approved and recommend some minor changes in one lab course (ZOC 230) MSc Syllabus from 2021-22 academic year.

- BoS identify some courses for credit mobility / add on course of some MOOCs through SWAYAM /NPTEL portal for the PG students for the academic year 2021-22.

Part B

i. Scheme of Examinations at undergraduate level: NA

ii. Panel of examiners for different examinations at the undergraduate level:

- BoS approved and recommend the panel of examiners for TYBSc. Syllabus w.e.f from 2021-22 academic year and the said panel will be valid till the academic year 2024-25.

iii. Scheme of Examinations at postgraduate level: NA

iv. Panel of examiners for different examinations at post-graduate level: NA

Part C.

i. Recommendations regarding preparation and publication of selection of reading material in the subject or group of subjects and the names of the persons recommended for appointment to make the selection: NA

Part D

i. Recommendations regarding general academic requirements in the Departments of University or affiliated colleges:

- BoS approved and recommend the syllabus for GUART- Zoology wef 2021-22.

- BoS approved and recommend the syllabus of PET- Zoology wef 2021-22.

ii. Recommendations of the Academic Audit Committee and status thereof: NA

Part E.

i. Recommendations of the text books for the course of study at undergraduate level: NA

ii. Recommendations of the text books for the course of study at post graduate level: NA

Part F.

Important points for consideration/approval of Academic Council

i. The important points/recommendations of BoS that require consideration/approval of Academic Council (points to be highlighted) as mentioned below

a) Minor Changes in the SY and TY Syllabus wef Academic year 2021-22. (Annexure 1a & 1b)

b) Identified courses for credit mobility/add on courses under MOOCs through SWAYAM /NPTEL portal for UG Students for the year 2021-22. (Annexure Ic)

c) Approval of Panel of Examiners for TYBSc Zoology from Academic year 201-22 to 204-25 (Annexure Id, in sealed envelope).

d) Minor Changes in the PG Syllabus wef Academic year 2021-22. (Annexure IIa)

e) Identified courses for credit mobility/add on courses under MOOCs through SWAYAM /NPTEL portal for PG Students for the year 2021-22. (Annexure IIb)

f) GUART Zoology (Annexure IIIa) and PET Zoology syllabus (Annexure IIIb) from the academic year 2021-22.

ii. The declaration by the chairman that the minutes were readout by the Chairman at the meeting itself.

Date: 23/07/2021
Place: Dept. of Zoology

Sd/-
Signature of the Chairman

Part G. The Remarks of the Dean of the Faculty

i) The minutes are in order
ii) The minutes may be placed before the Academic Council with remarks if any.
iii)May be recommended for approval of Academic Council.
iv)Special remarks if any.

Date: 24/07/2021
Place: Goa University

Sd/-
Signature of the Dean

Annexure 1a

SEMESTER III (ZOC-103, ZOS 101)
PAPER CODE: ZOC-103
TITLE: ANATOMY OF ANIMAL BODY SYSTEMS
THEORY (Credits: 04)

Learning Objective: To know structure and functions of the different systems in the vertebrates.

Learning Outcome: On completion of the course the student should be able to know the general plan and functioning of different components of the systems in the body.

Unit	Present Syllabus	Change suggested	Justification
Unit 1: Integumentary System	Structure, functions and derivatives of integument – 8	**No changes**	
Unit 2: Skeletal System	Overview of axial and appendicular skeleton, Jaw suspensorium, Visceral arches- 8		
Unit 3: Digestive System	Alimentary canal and associated glands, dentition-8		
Unit 4: Respiratory System	Skin, gills, lungs and air sacs; Accessory respiratory organs- 8		
Unit 5: Circulatory System	General plan of circulation, evolution of heart and aortic arches -8		
Unit 6: Urinogenital System	Succession of kidney, Evolution of urinogenital ducts, Types of mammalian uteri 6		
Unit 7: Nervous System	Comparative account of brain, Autonomic nervous system, Spinal cord, Cranial nerves in mammals- 8		
Unit 8: Sense Organs	Classification of receptors Brief account of visual and auditory receptors in man 6		

PRACTICALS

Experiment Number	Title	Changes	Justification
1	Study of placoid, cycloid and ctenoid scales through permanent slides/photographs	No change	
2	Disarticulated skeleton of Frog, Varanus, Fowl, Rabbit	No change	
3	Carapace and plastron of turtle /tortoise	No change	
4	Mammalian skulls: One herbivorous and one carnivorous animal	No change	
5	**Dissection of rat to study arterial and urinogenital systems (subject to permission)**	Dissection of dead fish (to be collected from the market) to study arterial system	Issues of Animal ethics

		and mounting of venous heart	
6	Study of structure of any two organs (heart, lung, kidney, eye and ear) from video recording/models/charts (may be included if dissection not permitted)	No change	
7	Project on **skeletal** modifications in vertebrates (may be included if dissection not permitted)	Project on **integumentary** modifications in vertebrates	Re-worded

SEMESTER –IV ,ZOC - 104

TITLE: ANIMAL PHYSIOLOGY & BIOCHEMISTRY PAPER CODE

THEORY (Credits: 04)

Learning Objective: To understand the physiology of the different processes of the body systems and the micromolecules and macromolecules of the cells.

Learning Outcome: On completion of the course the student should be able to know mechanism of body functions and the basic knowledge of chemistry of biomolecules.

UNIT	Present syllabus	Suggested Change	Justification
Unit 1: Physiology of Digestion 6	Structural organization and functions of gastrointestinal tract and associated glands; Mechanical and chemical digestion of food; Hormonal control of secretion of enzymes in Gastrointestinal tract.	No change	
. Unit 2: Physiology of Respiration	Mechanism of respiration - Pulmonary ventilation; Respiratory volumes and capacities; Transport of oxygen and carbon dioxide in blood; **Respiratory pigments**, Dissociation curves and the factors influencing it; Control of respiration	Mechanism of respiration - Pulmonary ventilation; Respiratory volumes and capacities; Resiratory pigments.Transport of oxygen and carbon dioxide in blood; Dissociation curves and the factors influencing it; Control of respiration	Reordering of topics.
Unit 3: Renal Physiology	**Structure of kidney and its functional unit**; Mechanism of urine formation; Regulation of water balance; Regulation of acid-base balance	Structure and function of kidney and its functional unit	Re-worded
Unit 4: Cardiovascular Physiology	Composition of blood, blood volume, Origin and conduction of the cardiac impulse, Cardiac cycle, Regulation of blood pressure and heart rate	No change	
Unit 5: Muscle	Types of muscles, Ultrastructure	Huxley's Sliding	Specified

Physiology	of skeletal muscles, properties of skeletal muscles, **theories of muscle contraction**	filament theory of muscle contraction.	
Unit 6: pH and buffer	Definition of pH, buffer, types of buffer.	Changed contact hours from **1 to 2**	More explanation required
Unit7: Carbohydrates	Structure and Biological importance: Monosaccharides, Disaccharides, Polysaccharides and Glycoconjugates	Changed contact hours from **7 to 6**	Adjusted total contact hours
Unit 8: Lipids	Structure and Significance: Physiologically important saturated and unsaturated fatty acids, Tri- acylglycerols, Phospholipids, Glycolipids, Steroids	No change	
Unit 9: Proteins	Amino acids: Structure, Classification and General Properties of α-amino acids; **Physiological importance of essential and non-essential α-amino acids** Proteins: Bonds stabilizing protein structure; Levels of organization in proteins; Denaturation; Introduction to simple and conjugate proteins.	Physiological importance of essential, **conditionally essential** and non-essential α-amino acids,	Inserted terms
Unit10: Enzymes	Nomenclature and classification; Cofactors; Specificity of enzyme action; Isozymes; Mechanism of enzyme action; Enzyme kinetics; **Factors affecting rate of enzyme-catalyzed reactions**, Concept of Michaelis-Mentenequation, Lineweaver-Burk plot, Enzyme inhibition.	Nomenclature and classification; Cofactors; Specificity of enzyme action; Isozymes; Mechanism of enzyme action; Factors affecting rate of enzyme-catalyzed reactions, Enzyme kinetics; Concept of Michaelis-Menten equation, Lineweaver-Burk plot, Enzyme inhibition	Re-structured

PRACTICALS – Credits 2

Experiment Number	Title	Changes	Justification
1	Measurement of blood pressure	No change	
2	Hemoglobin estimation		
3	Preparation of Haemin crystals		
4	Observation of Pulse rate under normal and stressed condition		
5	Respiratory rate of cockroach/any insect		
6	Qualitative tests to identify functional groups of carbohydrates in given solutions (Glucose, Fructose, Sucrose, Lactose)		
7	Estimation of total protein		
8	Study of activity of salivary amylase under optimum conditions (pH, temperature)		
9	Study of normal and abnormal constituents in		

	Urine		
10	Study of different types of muscle cells.		

Annexure 1b

T. Y. B.Sc. Zoology Syllabus Semester V ZOC 105: Endocrinology			
Unit No.	Existing Syllabus	Suggested Changes	Justification
1	**Introduction** Endocrinology, Endocrine glands. Concept of homeostasis - Glucose and Calcium Homeostasis	▪ Concept of homeostasis - Glucose and Calcium Homeostasis should be removed from Unit 1 and to be exclusively dealt with in Unit 5 and Unit 6. ▪ Reword to "**Introduction to Endocrinology**"	The topics are repeated and should be dealt along with the respective gland. Lectures allotted should be reduced from **7 to 4**.
2	**Endocrine Hypothalamus** Hypothalamohypophyseal portal system, Hypothalamohypophysealneurosecretary tracts, Hypothalamic nuclei, - Magnocellular and Parvicellular elements. Hypothalamic releasing and inhibitory hormones/factors.	▪ Hyphenate Hypothalamo-Hypophyseal Portal system, Hypothalamo-Hypophyseal Neurosecretory Tract.	Edited
3	**Hormones** Chemical messengers, type of chemical messengers. Hormones, types of hormones (proteins and steroids). Hormonal regulation of secretion – Feedback system- long loop, short loop, positive and negative feedback	▪ No change	
4	Hypophysis Gross anatomy, blood supply, histology of Adenohypophysis- identification of cell types based on staining affinities. Division and nomenclature of hypophysis. Hormones of Adenohypophysis, their functions and effect on target organs, Disorders of growth hormones.Neurohypophysis – Hormones of the neurohypophysis, Biological effects of Oxytocin and Vasopressin, Diabetes insipidus.	▪ No change	
5	**Thyroid** Structure, blood supply and nerves. Structure of thyroid follicles, principal cells and parafollicular cells. Biochemistry of Thyroid Hormones, Factors affecting thyroid functions. Clinical	▪ No change	Changed contact hours to cover calcium homeostasis. Lectures allotted should be increased from **7 to**

	aspects of thyroid functions (Cretinism, Myxoedema, and Graves‟ disease) Parathyroid – Histology, hormones, Regulation of Blood Calcium level, Parathyroid tetany.		**8**.
6	**Endocrine pancreas** Histology of Pancreas, Endocrine pancreas- Islets of Langerhans, types of cells (α,β,γ and δ). Effects of Insulin and Glucagon.Regulation of blood glucose level – Diabetes Mellitus (IDDM and NIDM)	▪ No change	Changed contact hours to cover glucose homeostasis. Lectures allotted should be increased from **6 to 7**.
7	**Adrenal** Anatomy of adrenal gland, Functional morphology of adrenal cortex, Zones of adrenal cortex - Histology. Adrenal steroid hormones - Glucocorticoids, Mineralo corticoids and Adrenal sex steroids. Regulation of Adrenocortical function. Adrenal medulla – Functional morphology of adrenal medulla, Hormones of medulla, **Catacholamines** and their roles in metabolism. Adrenocortical disorders – Cushing's syndrome and Virilism.	▪ Change Catacholamines to "**Catecholamines**"	Re-worded
8	Gonads as **endocrine structures** – Testes – endocrine component of testes (Leydig cells and Sertoli cells). Hormones of testes – Androgens and their biological role. Ovary - Endocrine components of ovary (Follicular wall Theca and Granulosa). Corpus luteum and Interstitial cells. Hormones of ovary and their biological functions. Placenta – Placenta and its Hormones.	Word "structures" replaced with "glands".	Lectures allotted should be increased from **6 to 7**.

ZOC 108: DEVELOPMENTAL BIOLOGY

Unit	Content	Suggested changes	Justification
Unit 1:	**Introduction** Branches of embryology. Scope of embryology. Gametogenesis: Spermatogenesis, Oogenesis, Vitellogenesis, Types of Eggs, Egg membranes. Fertilization: Definition, activation and Amphimixis. Types of Fertilization, Biochemical changes during fertilization, Significance of Fertilization. Parthenogenesis, planes and **Patterns of cleavages. Gastrulation** (Emboly and Epiboly) Fate maps and Cell lineage. **Organogenesis,** growth and differentiation	Reword Introduction to "**Introduction to Developmental Biology**". Types of cleavage should be included along with Blastulation. Organogenesis to be omitted	Since the course is on Developmental Biology, the name of the unit should be specific The topic of Gastrulation should be preceded by Cleavage and Blastulation Organogenesis is dealt in detail in Unit 4 under the topic Fate of Germ Layers **Number of lectures should be increased from 14 to 15.**

Unit 2: Transplantation, embryonic inductions, concept of organizer and competence	Definition of transplantation, nuclear transplantations, embryonic induction: Types, Concept of primary organizer, Experiments by Brachets, Spemann, and Mangold, Characteristics of an organizer, Regional specificity of organizer. **Neural induction:, mechanism. Surface interaction and chemical interaction**, Gradient theory of neural induction, Secondary, Tertiary and Quaternary organizers, Eye as an example of sequential induction, Competence.	**Neural induction mechanism - Surface interaction and chemical interaction**	Surface interaction and Chemical interaction are two most probable mechanisms of Neural induction hence to be considered as one topic. **Number of lectures should be reduced from 10 to 9**
Unit 3: Early Embryonic Development of Chick	Structure of Hen's egg, cleavage, blastula, Gastrulation, Development of chick embryo up to 3 days of incubation.		Contact hours allotted not enough for the detailed study of chick embryo Number of lectures should be increased
Unit 4: Late Embryonic Development	Fate of Germ Layers; Extra-embryonic membranes of chick (Development, structure and functions of yolk sac, Amnion, Chorion and Allantois, Placenta (Structure, types and functions of placenta)		
Unit 5: Regeneration and ageing	Types, Regenerative ability in different animal groups, Mechanism of regeneration, Stimulus and suppression of regeneration, Polarity in regeneration. Introduction to Ageing: Concepts and models. Apoptosis		
Unit 6: Implications of Developmental Biology:	Teratology. stage sensitivity of foetus, twins – Identical, fraternal, and conjoined - equal and unequal. Malformations in external structures of body. Causative factors in		

	teratogenesis. Infertility, Artificial insemination, Surrogacy, ART (Assisted Reproductive technologies), IVF and Test tube babies, GIFT (Gamete intra fallopian transfer) ZIFT (Zygote intra fallopian transfer) ICSI (Intra cytoplasmic Sperm Injection)		

SEMESTER VI

T.Y.B.Sc

Paper Code: ZOC 110: PARASITOLOGY

Sr. no	Existing Syllabus	Recommended changes	Justification
1	**Unit 1: Introduction to Parasitology** Scope of parasitology, historical perspective, parasites and parasitism; parasitoid and vectors (Mechanical and Biological Vector), host- parasite relationship.	**No changes**	
2	**Unit 2: Parasitic Protists** Study of Morphology, Life cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of the following: 1) *Entamoeba histolytica 2) Giardia lamblia 3) Leishmania donovani 4) Plasmodium vivax and P. falciparum*	**No changes**	

3	**Unit 3: Parasitic Platyhelminthes** Study of morphology, life cycle, prevalence, epidemiology, pathogenicity, diagnosis, prophylaxis and treatment of the following: 1) *Fasciolopsis buski 2) Schistosoma haematobium 3) Taenia solium 4) Hymenolepis nana*	**No changes**	
4	**Unit 4: Parasitic Nematodes** Study of morphology, life cycle, prevalence, epidemiology, pathogenicity, diagnosis, prophylaxis and treatment of the following: *1) Ascaris lumbricoides 2) Ancylostoma duodenale 3) Wuchereria bancrofti 4) Trichinella spiralis*	**Unit 4: Parasitic Nematodes** Study of morphology, life cycle, prevalence, epidemiology, pathogenicity, diagnosis, prophylaxis and treatment of the following: 1) *Ascaris lumbricoides* 2) *Ancylostoma duodenale* 3) *Wuchereria bancrofti* 4) ***Enterobius vermicularis***	*Trichinella spiralis* is parasite of cold regions. Barring a few cases reported from animal hosts in 1940s and last case being in 1966 from Bombay and Kolkata, this parasite has no epidemic significance in India. As such this parasite be replaced by pinworm (*Enterobius vermicularis*), which is common in a very common parasitic infestation of children in India
5	**Unit 5: Parasitic Arthropoda** Biology, importance and control measures of ticks, mites, *Pediculus humanus* (Head and Body louse), *Xenopsylla cheopis* and *Cimex lectularius*	**No changes**	
	Unit 6: Parasitic Vertebrates 06 A brief account of parasitic vertebrates: Cookicutter shark, Candiru, Hood Mockingbird and Vampire bat.	**No changes**	

Under Units 2, 3 and 4, the scope of discussion includes 'treatment' of the parasitic infection/infestation. While teaching it should be categorically mentioned that in this course the focus is on the parasite and not the patient. As such "Treatment " for all parasitic infestation /infection is not in the should be taken strictly under medical advice and supervision.

SEMESTER VI

T.Y.B.Sc

Paper Code: ZOS 104: ENVIRONMENT IMPACT ASSESSMENT

Sr. no.	Existing Syllabus	Recommended changes	Reasons
1	**Learning objectives**: To understand the theory and application of Environmental Impact Assessment, for fostering sustainable development. **Learning outcome:** On completion of the course the student will have clear understanding of Environmental Impact Assessment (EIA) as an Environmental Management Tool. The course shall impact competence for employment in EIA sector.	**Learning objectives**: To understand the theory and application of Environmental Impact Assessment, for fostering sustainable development. **Learning outcome:** On completion of the course the student will have clear understanding of Environmental Impact Assessment (EIA) as an Environmental Management Tool. The course shall endow the learners with competence for employment in EIA sector.	**More specific**
2	**Unit 1: Introduction and an overview of Environment Impact Assessment and its sustainability contexts**. EIA- Genesis, history and progression: Global Overview, Evolution of EIA in India, purpose and principles of EIA. A brief idea of Cost-Benefit analysis of EIA, EIA Notification, 2006 and Institutional frame work for conduct of EIA in India (Constitution and role of EAC of MoEF & CC, GoI, SEIAA and SEAC), project Categorization and Public involvement and participation in Key stages of the EIA process, Effectiveness and Benefits of Public Participation in EIA.	**No changes**	

3	**Unit 2: Stages of an EIA Process and Environmental Clearance for Projects** Flowchart of a Generalized EIA process: Screening: Purpose and screening methods. Scoping: Role and purpose of Scoping in EIA, Guiding principle and objectives of scoping, steps involved in scoping, Terms of References (ToR), Identification and consideration of alternatives. Baseline Data-Collection, collation and analyses for Impact Identification and Assessment Methods by Checklists, Matrices, Wind Rose Diagrams, Networks, Overlays and Geographic information system (GIS). Public Hearing, Appraisal, Grant or Rejection of Environmental Clearance (EC), Validity of the Environmental Clearance, Environmental Management Plan, Post EC Monitoring.	**Unit 2: Stages of an EIA Process and Environmental Clearance for Projects** Flowchart of a Generalized EIA process: Screening: Purpose and screening methods. Scoping: Role and purpose of Scoping in EIA, guiding principle and objectives of scoping, steps involved in scoping, Terms of References (ToR), Identification and consideration of alternatives. Baseline Data-Collection, collation and analyses for Impact Identification and Assessment Methods by Checklists, Matrices, Wind Rose Diagrams, Networks, Overlays and Geographic information system (GIS). **Public consultation**, Appraisal, Grant or Rejection of Environmental Clearance (EC), Validity of the Environmental Clearance, Environmental Management Plan, Post EC Monitoring.	Public consultation includes Public Hearing and written responses. **Change in terminology.**
4	**Unit 3: Functional areas in appraisal of environmental impact** Capacity Building in various Functional Areas of EIA, Quality and Quality Control in EIA, The convention of Environmental Impact Assessment in a Trans-boundary Context. Brief idea of Prediction and Assessment of Impact on the Land Use, Air Environment, Surface-Water Environment, Soil and Groundwater Environments, Noise Environment, Biological Environment including Wildlife Conservation Plan, Cultural (Architectural, Historical, and Archaeological) Environment, Socio-economic Environment, Health Impact assessment**.**	**No changes**	

5	**Unit 4: Capacity Building for effective EIA** EIA as a statutory requirement in India, QCI NABET as an Accreditation agency for EIA Consultants thereof, NABET secretariat, Committees (Technical, Accreditation), Assessors, and Specialist; requirements of accreditation and Key persons in an EIA Consultancy (EIA Coordinator, Associate EIA Coordinator, Functional Area Experts, Functional Area Associates, Team members and Mentors, Accreditation Cycles and Process, Punitive action for misconduct, fraudulent data and the Confidentiality clause, overview of project sectors listed by NABET.	**No changes**	
6	**Unit 5: EIA in practice in some important sectors and case studies.** Knowledge of EIA related organizations including International Association of Impact Assessment-US (IAIA), Important Consultants and NGOs working in the field of EIA, EIA generic structure for Mining, Building constructions & Township, Common Municipal Solid wastes treatment Facility, and Sea Ports; Case studies of National and state relevance for critical analysis; EIA of Sardar Sarovar Project and CEE's report on EIA of Iron Ore Mining in Goa.	**No changes**	

SWAYAM
Courses recommended for

Undergraduate Level

Courses >

Remote Sensing and GIS

By Prof. Rishikesh Bharti | IIT Guwahati

Join Learners enrolled: 2763

https://onlinecourses.nptel.ac.in/noc21_ce61/preview

This course will introduce the students to the state-of-the-art concepts and practices of remote sensing and GIS. It starts with the fundamentals of remote sensing and GIS and subsequently advanced methods will be covered. This course is designed to give comprehensive understanding on the application of remote sensing and GIS in solving the research problems. Upon completion, the participants should be able to use remote sensing (Satellite images and Field data) and GIS in their future research work.

INTENDED AUDIENCE : UG, PG and PhD Students
PRE-REQUISITES : Nil
INDUSTRY SUPPORT : Esri, Rolta India, RMSI Private Limited, ArcGeosystems

Summary

Course Status :	Upcoming
Course Type :	Core
Duration :	8 weeks
Start Date :	26 Jul 2021
End Date :	17 Sep 2021
Exam Date :	26 Sep 2021 IST
Enrollment Ends :	02 Aug 2021
Category :	Civil Engineering
Credit Points :	2
Level :	Undergraduate/Postgraduate

This is an AICTE approved FDP course

Course layout

Week 1 : Remote Sensinq Data and Conections
Week 2 : Satellite Image Conections
Week J : Digital Image Processing-I
Week 4 : Digital Image Prooessing-II
Week 5 : Thermal and Ivlicrowaw
Week 6 : Imaging 5pectroscopy-I
Week 7 : Imaging 5pectroscopy-II & GIS-I
Week 8 : GIS-II and Application

T ankstotha src x›rt **From** MathWraks, **evolled** students **have** acoass to htATLAB for the d oftha course.

Books and refeences

1. Lillesand, T.M. and Kiefer, R.W., 11B7. Remote sensing and Imaqe Interpretation, John Wiley.
2. Jengert J. R. Introductory digital image processing a remote sensing perspective, Prentice Hall series in geographic information science.
5. Scho›vengerdt, R. A., 2007. Remote Sensing: Models and klethods for Image Processing, Academic Press.
4. Campbell, J.B., 1006. Introduction to Remote tensing, Taylor & Francis, London.
S. Cracknell, P: and Hayes, L IMroduction to remote sensing
6. Jengey J.R., 2DD3. Remote Sensing of the Environrrient an Earth Resource Perspecti 'e, Pearson Education, Del hi.

InZmZor bio

Prof. Rishlka8h Bharti

IIT Guwahat

Rof. Righikesh Bharti is a faculty member at the Depanrnent of Cix'il Engineering Indian Institute of Technology Guwahati. He has been teaching Advanced Remote Sensing, Geohazard Science and Engineering, Advanced Techniques in Geoscience, Engineering Geology Joffre B.Tech, M.Tech and PhD students at IIT Guwa hati. Hydrogeornorpholoqy, Geospatial modelling Sno» and Glacier Studies, Spectroscopy of natural & manmade materials and Advance remote sensing (Hyperspectral and thermal) for the earth and planetary exploration are his major marchinterests. He hope participants will enjoy and learn the proposed course. The details of his research can be found at Website: http:,*,*www.iitg.ac.im'rbhani/'

Animal Physiology

https://onlinecourses.nptel.ac.in/noc21_bt46/preview

By Prof. Mainak Das " IIT Kanpur

Jain **Learners** enrolled: 2069

the course Will be an informal journey to '#nav your own body'. ft will provoke you to tnin# the follo\vi"ng:

- How our body functions?
- What it is mzde up of and what are the organizational hierarchy of your bodv?
- How its regular functic+i is disrupteo and how the boay tries to restore its normal funnioning?
- How 1:he body ad;usts if un0er extreme physiological situations and hoW it re-calibrates its fioictions?

Summary

Course Status :	Upcoming
Course Type:	Core
Duration :	12 weeks
Stan Date:	26 Jul 2021
End Date :	15 Oct 2021
Exam Oate :	24 Oct 2021 UT
Enroll merrt Ends	02 Aug 2021
Category :	+ BiOtDL}lCd I (9flC9S & Bioengineering
Cradit Points:	3
Level :	Undergraduate/Postgraduate

This is an AICTE approved FDP course

Course layout

Weeh 1: Imroduction
Weeh 2: Skeletal svstem
Weeh J: Muscles
Weeh 4: Neural gystem
Weeh 5: Neural gystem
Weeh 6: Neural gystem
Weeh 7: Neural gystem
Weeh 8: Neural gystem and Special senses
Wnoh 9. Neural system and Special senses
Wnoh 1d: Cardiovascular system
Wnoh 11: Respiratory and Blood
WnBi 12 Endocrine, Digestive. Blood, Kidnp'. and Reprod•uctive system

Books and references

- Guyton and HzII Textbook of Medical Physiology
- Garong'5 Rey of Med Physiology
- Fundamentals of anatomy and physiol by Martini

Incmctar bio

Prof. Malnak Das

lfT Kanpur

Pror.uainak Das is a faculty of IIT Kanpur India inthe department of biological sciences & bioengineering since April 26 201B. He did his bachelors degree f1989-1994, in agricukure from College of Agricukure Indore. Thereafter he did his post qraduate degree i'19941997› in animal physiology from National Dairy Research Institute Kamal India. Following his post graduate studies, he worked as researcher in IISc Bangalore India (-!997-1199}. University of Neuchstel. S 'ioerland (1999-2d00), University of Clemson, LICA (20BB-2004'i and in diversity of Central FIGFIda, USA (2gd42010). He did his doctoral studies from College of k4edicine of University ol Central Florida (2004-2B08), vAile working as a full time employee of the university. He introduced the regular physi'oIogy course for the PG students in IIT Kanpur in 2fl11. He has wide interest in phvsioiogy, sensors. energy and bioeiectronics and maintains an active research team at IT KanDur, India. Prof. Das has been '.vorkinq on cell culture technologies, serum free medium Velopment and defined cell culwre systems for last 20 wars. He has expertise in long ta m culturing of excitable cells. His doc1:oral thesis is a complex problem of modern ceil culture technology. titled:'Tissue Engineering The Moton=uron To Muscle Segmem Df The Stretch Reflex Arc Circuit tttilizing Micro-fabrication,lMerface Design And Wfined Medium Formulation'.

onlinecourses.swayam2.ac.in/cec21_hs43/preview

About Swayam | All Courses | shantidessai@unigoa.ac.in

https://onlinecourses.swayam2.ac.in/cec21_hs43/preview

Courses >

Biogeography

By Dr P.T. Bharathi | Department of Geography, Maharajas College, University of Mysore

Join Learners enrolled: 446

Biogeography deals with the World Biomes in addition, this area of Biogeography focuses on the Geographical Distribution of Fungi, Flora, Fauna etc. It also consists of detailed account of Darwin's Theory of Evolution, Human Races, Glaciations Cycles and Extinctions and Ecology. Man-Environment Relationship, Population and Settlement and Domestication of Life are also dealt with.

Summary

Course Status :	Upcoming
Course Type :	Elective
Duration :	12 weeks
Start Date :	05 Jul 2021
End Date :	18 Sep 2021
Exam Date :	
Enrollment Ends :	31 Aug 2021
Category :	Humanities and Social Sciences
Credit Points :	4
Level :	Undergraduate

Course layout

Keek — ^ 1 1. Biogeography an outline 2. World Climatic Zones | 3. World Biomes Part -1 | 4. World Biomes Part -2 I

Keek — 7 15. The Tundra Biomes I s. Classifying the Bio climatic Zones 1 7. Biogeography Processes 1 8. Geographical Distribution of Fungi I

week —a 18. Global Distribution of Plants 1 D. Global Distribution of animals 1 11. Types and Distribution of Forest I

week 1 1 1 2. Types and Distribution of Fisheries 1 1 3. Phytogeography 1 14. Phylogeography I

Keek — * 1 15. Hatural Vegetation and Ecosystem | 16. Island BiogeogaPly 1 17. Darwin's Theory of Evolution I

week — 6 1 18. Human Races in India | 19. Human Races of the World 1 20. Issues related to Human Races I 21. Agra ecological zones Part — 1

week — 7 I z2. Agro ecological zones Part - z 1 23. Types and Distribution of Flora and Fauna I z4. Glaciations I z5. Glaciations Cycles and Extinctions I

week ** 1 26. Geographical range 1 27. Aquatic system - Marine 16 . Aquatic system - Fresh water I zs. Habitat destruction

Keek — 9 130. Health Geography 1 31. Ecology and Geography | 32. Geo-terrestrial Ecosystem | 33. Ecosystem Budget I

Week - IO | 34. Human Induced Community Change I s5. Major Gene Centre 1 36. Geography of Communities 137. Lifestyle of Humankind I

Week - 11 | 38. Population and Settlement | 39. Man-Environment Relationship 1 40. Domestication of life I

Courses ›

Basic Human Genaics

https://onlinecourses.swayam2.ac.in/cec21_bt21/preview

By Prof. k1d. Niamat Ali Universi1:y of Kashmir

Join Lsamats onrolled. 71I

Tf'is course is designed to develop an ap prec:iajjon Mr the giouzidvvork carried out so far in order to gain an insight into mechanisms of I+uman genetic diseases, relate to hav it has been built on the numerous genetic studies carned out over decades to cantribute to the undernanding of relationship between genotype and phenotype. The time is poised for understanding human as a model orgeisrrt. The course 'will also iMroduce the methods for 'A'hole genome analysis and the genome seque+icing.

Summary

Course Status :	Upcoming
Course Type:	Elective
Duration :	6weeA
Start Date :	fl6 Sep 2021
End Date :	l6O+202J
Exam Date:	
Enrollment Ends	11 Aug 2021
Category :	+ Biological Sciences & Bioeogineerirxj
Credit Points :	2
Leve! .	Undergraduate

Course layout

1st
History of Human Genetics, Pedigree Analysis (Pedigree symbols and construction of pedigrees, inheritance pattern and risk assessment
Presentation of molecular genetic data in pedigrees)
Patterns of Inheritance for Monogenic Traits:
Autosomal inheritance-dominant, recessive, sex-linked inheritance, sex-limited and sex- influenced traits and mitochondrial inheritance
Deviations from the basic pedigree patterns- nonpenetrance, variable expressivity, pleiotropy, late onset, dominance problems, anticipation, genetic heterogeneity and uniparental disomy. X-inactivation and dosage compensation
Mosaicism and chimerism, consanguinity and its effects, epigenetic modifications and imprinting
2nd
Human Genome Project: History, organization and goals of human genome project.
Tools (Vectors- BAC, PAC, YAC and sequencing techniques) and approaches (Hierarchical and shotgun sequencing), outcomes ethical issues and applications in human diseases
Organization of the Human Genome: General features: Gene density, CpG islands, RNA-encoding genes. Gene clusters, diversity in size and organization of genes, types of repetitive DNA, pseudogenes, gene families
Endoreplication and amplification
genetic markers and their applications
3rd
Human Cytogenetics Technique: Fluorescence in situ hybridization (FISH)
Human karyotype:
Banding pattern and nomenclature (G and Q banding)
Common syndromes due to numerical chromosome changes
Common syndromes due to structural alterations(translocations,duplications,
deletions, microdeletion, fragile sites
Common chromosome abnormalities in cancer
Techniques for Genomics: DNA sequencing (Maxam-Gilbert and Sanger Method, introduction to NGS), DNA fingerprinting,

4th
Polymorphism screening (genotyping of SNPs)
Microsatellite markers, expression and proteome analysis.
Population Genetics: Genotypic and allelic frequencies, linkage disequilibrium, haplotype construction (two loci using SNPs and/or microsatellites)
Mapping Strategies: Physical maps (different types- restriction, cytogenetic maps, use of FISH in physical mapping, radiation hybrids and clone libraries in STS mapping) and genetic maps
5th
Identification of Genetic Basis of Disease
Principles and strategies, positional and candidate gene approaches, positional- cloning approach (examples- HD, CFTR), concept of twin and adoption studies
Prenatal Diagnosis: Brief introduction, methods of prenatal diagnosis
Clinical Genetics: Inborn errors of metabolism and their genetic basis (example- phenylketonuria), genetic disorders of haemopoietic systems (examples- sickle cell anemia and thalassemia),
Genetic basis of color blindness
6th
Biosafety of human genetics:
Biosafety for human Health and Environment. Biosafety issues for using cloned genes in Medicine, Agriculture, Industry, and Ecoprotection.
Gene Pollution, Biological Invasion, Risk and Safety Assessment from Genetically Engineered Organisms, Special Procedures for r-DNA based products, Biological Warfare, Biological Containment (BC) and Physical Containment (PC),
CDC Biosafety levels, Biosafety in Clinical Laboratories and Biohazard Management
Bioethics of human genetics:
Ethical Issues of the Human Genome Project, Code of Ethics in Medical/clinical laboratories. Ethical Issues of Xenotransplantation,
Ethics involved in Embryonic and Adult Stem Cell Research, Ethics in Assisted Reproductive Technologies: animal and human cloning and Invitro fertilization, the element of Informed Consent

Books and references

1. Strachan and Read. Human Molecular Genetics.4th Edition. Garland Science, 2010. ISBN: 978-0815341499.
2. Cantor and Smith. Genomics, 2002, John Wiley and Sons, Inc. ISBN: 9780471599081.
3. J.N. Pasternak. An introduction to Human Molecular Genetics, 2nd Edition, Wiley-Liss, 2005. ISBN: 978-0-471-47426-5.
4. G.N. Wilson. Clinical Genetics: A short Course. Wiley-Liss, 2000. ISBN: 978-0471298069.
5. Vogel and Motulsky, Human Genetics: Problems and Approaches, 3rd Edition, Springer Verlag, 1997. ISBN: 978-3-540-37653-8.
6. T.A. Brown. Genomes, 2nd edition, Oxford: Wiley-Liss; 2002. ISBN-10: 0-471-25046-5.

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Courses >

Basic concepts in Enzymology

https://onlinecourses.swayam2.ac.in/cec21_bt20/preview

By Dr. Deepa G Muricken | St. Mary's College Thrissur

Join Learners enrolled: 767

Enzymes are pivotal part of living system. They are biological catalysts that perform myriads of metabolic reactions that sustain life. Enzymes facilitate life process in all life forms ranging from prokaryotes to eukaryotes. Hence the study of enzymes is crucial in understanding biochemical basis of life.
This course on 'Basic concepts in Enzymology' is designed to introduce students to various theoretical and

Summary

Course Status :	Upcoming
Course Type :	Core
Duration :	12 weeks
Start Date :	05 Jul 2021
End Date :	22 Sep 2021
Exam Date :	
Enrollment Ends :	31 Aug 2021
Category :	o Biological Sciences & Bioengineering
Credit Points :	4
Level :	Undergraduate

Course layout

Weeks	
1	Module 1,2,3
2	Module 4,5,6
3	Module 7,8,9
4	Module 10,11,12
5	Module 13,14,15
6	Module 16,17,18
7	Module 19,20.21
8	Module 22,23,24
9	Module 25,26,27
10	Module 28,29,30
11	Module 31,32,33
12	Module 34,3S,36

Books and references

1. Biochemistry. 5th edition, Berq JM, Tymoczko JL, Stryer L. publisher: W H Freeman
2. Biochemistry, 2nd edition Reginald Garrett and Charles Grisham
3. Enzymes 2nd Edition Biochemistry, Biotechnology, Clinical Chemistry by T Palmer P L Bonner
4. Color Atlas of Biochemistry 2nd edition by Jan Koolman and Klaus-Heinrich Roehm
5. Cornish-Bowden, A., Fundamentals of Enzyme Kinetics (revised ed.), Portland Press (1995”). [A lucid and detailed account of enzyme kinetics.]
6. Nelson, David L. (David Lee), 1942-. Lehninger Principles of Biochemistry. New York :W.H. Freeman, 2005.
7. Voet, D., Voet, J. 6., & Prart, C. W. (2008). Fundamentals of biochemistry: Life at ihe molecular level. Hoboken, NJ: Wiley.
8. Tymoczko, LubertStryer,and LubertStryer. Biochemisiry. New York: W.H. Freeman, 2002. Prim.

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Biodiversity and Ecological Resources

By Dr. Javid A. Parray | Govt. Degree College, Eidgah, Srinagar

Join Learners enrolled: 913

https://onlinecourses.swayam2.ac.in/cec21_ge31/preview

The course "Biodiversity and Ecological resources" would serve a 04 credit Core Course in B.Sc. Environmental Science, under the Choice Based Credit System (CBCS) of UGC. The course would also be useful as one of the compulsory subject for all students of the undergraduate streams, e.g. arts, science, commerce and other biomedical sciences. The environmental studies course gives an overview towards understanding of basic environment and ecological services. The conservation and management of natural

Summary

Course Status :	Upcoming
Course Type :	Core
Duration :	12 weeks
Start Date :	09 Aug 2021
End Date :	30 Oct 2021
Exam Date :	
Enrollment Ends :	31 Aug 2021
Category :	◦ Multidisciplinary
Credit Points :	4
Level :	Undergraduate

Course layout

WEEK 1

Concept of an ecosystem

Structure and function of an ecosystem

Definition: Genetic, Species and Ecosystem diversity

Producers, Consumers and decomposers

WEEK 2

Energy Flow in the ecosystem

Food Chains, Food webs

Ecological Pyramids

Ecological Succession

WEEK 3

Endangered and endemic species of India

Concept of exotic species

Forest ecosystem

Desert Ecosystem

WEEK 4

Grasses & Grasslands — I

Grasses & Grasslands — II

Grasses & Grasslands -III

Aquatic ecosystems (ponds, sDeams, lakes, rivers, oceans, estuaries)

WEEK 5

Value of biodiversi Consumptive use, productive use, social, ethical and aesthetic and option values

Threats to biodiversity: Habitat loss, poaching of wildlife, mamlife conflicts

Hotspots of biodiversity — I

Hotspots of biodiversity — II

WEEK 6

In-situ Conservation of biodiversity

Ex-situ Conservation of biodiversity

Biogeographical classification of India

India as a mega diversity nation

Biodi 'ersity at Global, national and local level

Land Resources

ForeM Resources: U se and over exploitat io n, deforestation

Idineral Resources: Use and exploitation, environmental effect s. Cases

WEEK 8

Use and over-utilization of surface and ground heater

Floods, drought, conflicts over heater resources

Fo od Resources: World food problems, changes caused by agricuhure and overgrazing, effects of modern agriculture, fenilizer-pesticide problems, water logging, salinity, case studie s

Sources of Energy

yyggg g

Energy Resources: Non-Renewable energy sources and use of altemati 'e energy sources

Urban problems related to energy

Growing energy needs, Energy crisis and Renewable energy sources

Concept of water ha a'estinq and water shed managemem

10

Concept of Ecoloq ical footprint

Carbon sequestration

Biological diversity act

Mational Green Tribunal Act /2010}

WEEK 11

Monitoring and management of biodi\'ersity

Idanaqement of mineral resources

Idanaqement of fresh water resources

Idanaqement of forest resources

WEEK 12

Microbial di\'ersity in soil

Functions of microorganisms in environment

Microorganisms and Human health

Manaq ement of microbial resources

Instructor bio

Dr Javid A Parray

Goyt. Degree College, Eidgah, Srinagar

Dr Javid A Parray holds a III Degree in Environmental Science and has completed his Research Programme (h1Phil and PhD) from the Uni\'ersity of Kashmir after qualifying state leHel presti gi ous JKSLET *ex a mi nation*. He has also done his Post Doctorate Research from the University of Kashmir. Dr Parray was also awarded a Fast Trac k Young Scientist Project by SERB — DST, Gel Aleyy Delhi. He currently teaches at th e Department of Environmental Science, GDC Eid gah Sñnag ar affiliated to Clu ster University Srinagar. He has amended ma ny courses and conference s a n environmental issues and other biotechnological aspec tg ›yithin and outside the country like Srilanka, Indonesia, Ivlal aysia etc. His fundamental research interests incl ude ecological and agricultural microb iology, climate change and microbial biolec h nology, environmental microbiome etc. He has published more than SD high-imp act research papers and book chapters in reputed jo urn als and publishing Hubs. Dr Parray has aut hored 06 books \ ith international publishers lke Elsevier, Springer, Callisto Reference USA and Wiley-Blackwell. Dr Parray is on the editorial board, and permanent revie›yers of ma ny journals and has been an invited epeake r at various scientific meetings7'co nferences within India and ab road. H e is also a Guest editor for a special issue on Environmental Biofilm s \ ith Biolvle d Research IMernation al, Hindwaii. He is member of many International and National scientific organi zations and soci eties like Asian PGPR Society, UML Mumbai, Academy of Eco science, IAES H aridwar etc. Dr Javid was also awarded as "Emerging scientist year Gold k4edal' for the year 2D18 by Indian Academy of Environmental Science.

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Courses >

Biogeography

By Dr P.T. Bharathi | Department of Geography, Maharajas College, University of Mysore

Join Learners enrolled: 492

Biogeography deals with the World Biomes in addition, this area of Biogeography focuses on the Geographical Distribution of Fungi, Flora, Fauna etc. It also consists of detailed account of Darwin's Theory of Evolution, Human Races, Glaciations Cycles and Extinctions and Ecology. Man-Environment Relationship, Population and Settlement and Domestication of Life are also dealt with.

Summary

Course Status :	Upcoming
Course Type :	Elective
Duration :	12 weeks
Start Date :	05 Jul 2021
End Date :	18 Sep 2021
Exam Date :	
Enrollment Ends :	31 Aug 2021
Category :	o Humanities and Social Sciences
Credit Points :	4
Level :	Undergraduate

Course layout

Week - 1.1 1. Blogeogr3phy as outline 1. 2 \'/orld Cliiasatic Zones I */orId Biomes Part -1 I ‹ \'/orld Bionses Part -2 I

Week - 2 I The TulJcl•a Biomes 16 Classifyikg the Bio climatic Zones 7 Biogeography Processee | 8 Geog•a3 tical Dist•ib Jtion Of Fungi

Week - 3. 1. 9. Globa I Dist•i but ion of Pl3nts 10. Globa I Dist•ib ation Of 3ninsals 111. Types anal Distribution of Forest

Week - 4 | 12 Types and Distribution of Fisheries 13. PlJytogeograpny 14. PtJylogeog•apny

Week - 5. 1 15. Natural Vegetation and Ecosystem | 16 Isla md Bioqeog•apny | 17 Dary.'it's Tneoy of E\'O JtIO

Week - 6. 1 18. HucJan Races in Icdia 1. 19 Huilsais Races of the */orId | 20 Issues related to Hunsan Races 2"I +'g•o ecological zones Pa•t — 1

Week - 7. 1 22. Agro ecological zones Part - 2 | 23. Ty3es and Dist•ioutiois of Flora and Fauna 24. Glaciations 25 Glaciations C\'cles and Extinctions

Week - 8 | 26. Geographic al range 27. Aquatic system - M3rine 128 A.quatic system - Fresh '.'ater 125 Habitat Destruction I

Week - 9. 1 30. Health Geography 31. Ecology and GeograptJy 32. Geo-terrest•I3I Ecosystens 133 Ecosystem Budget

Week - 10. 134 Hunsan Induced C ocJnJunity Change 135. Major Gene Cent•e 13. 6 Georg •aohy of CocJnJunities 13. 7 Lifestyle of Hunsa n‹ilJd

Week - 11 | 38 Population a md Settlement 39 Mai -Envi•onn ent Relationship | 40. Domestic ation of life

Instructor bio

P.T. Bharathi

Department Of Geography, Maharajas College, University Of Mysore

I Dr P T. BHARATHI, P•iI cipal In\'estigator.. Course coordinator for BIOGEOGRAPHY course under Massi've Open Online Courses ‹MOOCs) curvently '.'‹'or‹ing as Associate Professor in the Dep3rtn eat of Studies GEOGRAPHY, MAHARAJA S COLLEGE, Uni›'ersity of M\'so•e, Mysu u. obtaired Bacnelor's, Masters and Doctoral degrees '.' its di stinction Irons the Jni.ersit\' of MYSORE. I leave more than 6 years of research and 2"I vea•s of teaching experience

I an a eci| ient of 2 Gold Medals and one cash prize fo• the Master's Deg•ee. leave Partick pated in more that 50 nationaI ai rI international Conferences .•' Sec ii a•s .' \'/orksho;as, besides Ians na›. ii g a life nsembe•s his of acacleiisic bodies like Jnion Geog apce•s Infori nation Tecl+sologists, ‹UGIT Bengaluru and UG Board of Studies in Geograpf \', University of Myso•e. I have store ttsai 1. 0 research publications to nay credit in the journals of national and iIJte•national repute, Besides I na.'e organised one National senimar.

Annexure IIa

Laboratory Course-2: ZOC 230 (Ecology Component)

EXISTING	REVISED	REASON
1. Assessment of density, frequency and abundance of animals in a community using various techniques i.e. transect, quadrate etc.	1. Assessment of density, frequency and abundance of animals in a community using various techniques i.e. transect, quadrant, etc.	Spelling error
2. Measurement of Productivity in ecosystems.	2. Estimation of Aquatic – primary productivity – Dark and Light bottles	Method specified
3. To study frequency of herbaceous species in a landscape and to compare the frequency distribution with Raunkiaer's standard frequency diagram.	3. Soil Sampling and estimation of Benthic biomass in an aquatic ecosystem (Replaced)	Non-availability of sampling, practical changed.
4. To determine the biomass of a particular area.	4. Estimation of pyramid of numbers and biomass in aquatic/ forest/plateau ecosystems	Method specified
5. Food web analysis and studies along with energy flow.	5. Observation on Bird/Butterfly plant interaction on the University campus. (Replaced)	Need long term study hence replaced
6. Decomposition of various organic matters and nutrient release mechanisms, quantification / role of arthropods and other micro-, and macro fauna in decomposition.	6. Determination of Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) in given water sample. (Replaced)	
7. Bio magnification/Bioaccumulation analysis in ecosystems.	7. Study of Sandy, Muddy and Rocky shore fauna with special reference to the adaptation to the environment. (Replaced)	Method specified
8. To study the biotic components of a water body.	8. Principals and its interpretation of Geoinformation systems (GIS), Global Positioning system (GPS) and Remote Sensing Technology.	
9. Principles of GIS, GPS and Remote Sensing technology.		Practical 9 and 10 are merged
10. Interpretation (visual and automated) of remote sensing		

information for landscape differentiation.		

1. Nomenclature of the cluster **Field biology** has been recommended to be changed to **Wildlife Biology**

SWAYAM
Courses recommended for

Postgraduate Level

Courses >

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Academic Writing

By Dr Ajay Semalty | HNB Garhwal University (A Central University) Srinagar Garhwal (Uttarakhand)

Join Learners enrolled: 5500

Number of Credits :-4

(This cycle of Academic Writing MOOC is dedicated to our fellow Course coordinator Late Dr Lalit Engle of EMRC, Indore, who lost his life to COVID.)

Myself, Dr Ajay Semalty, from HNB Garhwal University (A Central university) Srinagar Garhwal, Uttarakhand welcome you on behalf of our entire team in the new cycle of our course. After the four successful run of the course, we are proud to present India's most popular SWAYAM MOOC which got maximum number of exam registration (among all the SWAYAM MOOCs) and has been listed in top 30 MOOCs worldwide (http://tiny.cc/pib27april2020; Course in News: http://tiny.cc/AWnews). So far, more than 35000 learners across more than 95 countries have taken the advantage of the course.

In academic and research, who does not want the publications? In spite of being the vital requirement in academic & research career there is no comprehensive set up of learning academic writing in the knowledge domain. This course aims to fill this gap by providing the fundamental knowledge required for effective and result oriented academic writing. It is a foundation course and the application of this knowledge completely depends on an individual learner and his or her area of research.

Summary

Course Status :	Upcoming
Course Type :	Elective
Duration :	15 weeks
Start Date :	12 Jul 2021
End Date :	23 Oct 2021
Exam Date :	
Enrollment Ends :	31 Aug 2021
Category :	Multidisciplinary
Credit Points :	4
Level :	Postgraduate

CoursR layout

Course Duration 15 week

Credits : 04

Week 1

Academic B reseamh writing: Introduction; Importance of academic writing; Basic r

Week2

English in academic wr”rting I B II; Styles of research wr”ñing

Astr

Plagiarism: Introduction; Tools forlhe detection of plagiarism; Avoiding plagiarism

Astt

Journal Metrics

neese

Author Metñcs

Week 6*

Literalure review: Introduction, Soume of l”rterature; Process of l”ñerature review

Online l”ñerature dalabases; L”rterature management tools

Review Paper Wr”ñing, 18 II

Week 10

Referencing and c”ñation; Submission and; Post submission

Week11

Thesis Wr”ñing I, II & Ill

Week12

Empirical Study I, II & III

Week 1S*

Challenges in Indian research B **writing;** Team management (mentor and collaborators); Time Management

Week 14*

Reseamh proposal wr”ñing; Abstract/ Conference Paper/ Book/ Book Chapter writing; OERs: basic concept and licenses

Week 15*

Open Educational Resoumes (OERs) for learning B Research; OERs development I & II

Ethics in Research: Reseamh fraud, competing interest, authorship, slicing research, FFP, COPE guidelines.

Ethics" prescribed for Pre Ph D Courses work of every subject.

Join Learners enrolled. 795

https://onlinecourses.nptel.ac.in/noc21_cy48/preview

The extraordinary important iole of metal ions in biology, heath, diseases and medicine has become increasingly evident over 1ne last three decades or more. The inorganic aspects of life processes and biological processes can be understood from the vie 'poiM ot the coordination chemistry of metal ions. The studv of metal ions in biological systems can only be appreciated from a multidisciplinary a | 'DBCh. n. stoys within the rapidly growing interface betw inorganic Ehemistry and the li s ng world. It is increasingly recognizedlftat sheeted metal Ions are invoked in cellular and subcellular functions.

lKTZhIDEO AtJD!ENCE : MSc, kfTech and MPharm
PREREOUi9iTE6 1. Coordination Chemistry 2. Basic Bioinoiganic Chemistry
INDUSTRY SUPPORT 1. BioTech companies 2. BioRocess companies 3. BioCatalyst industries

Summary

Course Status :	Upcoming
Course Type:	Elective
Duration :	12 weeks
Stan Date :	26 Jul 2021
End Date:	15 Oct 202t
Exsm Date:	23 Oct 202t IST
Enrollment Ends	02 Aug 20Z1
Category:	Chemistry
Credit Points :	3
Level .	PDostgraduate

This is an AICTE approved FDP course

Course layout

Week 1: Outlii e of metal ions in oioIogy
Week 2: Natural and biological ligands for essential metal ions
Week 3: Physical methods to study metal ions biological systems
Week 4. Assimilation pathways, transport, storage and homeostasis of biogenic metal ions
Week 5: Ion channels and pumps involving sodium and potassium ions
Week 6: Magnesium ions for phosphate metabolism and cellular signaling using calcium ions
Week 7: Iron ions in life processes: dioxygen management
Week 8: Biochemistry of copper ions
Week 9: Enzymes containing zinc ions: Action of Lewis acid
Week 10: Biological actions of manganese, cobalt and nickel ions
Week 11: Nonmetallic species in biology
Week 1Z: Metal ions in brain and medicine

ns bi

Prof. Debashis Ray

UT Kharagpur

Prof. Debashis Ray is an M. Sc. (Gold Medalist) from Burd van University in 1985 and did his PM. D.from IACS (degree from Jadavpur University) in 1989 and in faculty roll of IiT Kharagpur from 1990. Specialization: Inorganic Chemistry, Coordination Chemistry, Bioi norganic Chemistry, é.nalytical Chemistry.Received INSA YS Medal in 1994 and CRSI Bronze Medal in 2007. PHE DeDt.

Books and references

1. Biocoordination Chemistry, D E Fenton, OUP, 2002
2. Principles of Bioinorganic Chemistry, S J Lippard and, J M Berg, USB, California, 1994
3. Biological inorganic Chemistry, R R Cr icl tan, Elsevier, 2012

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Biostatistics and Mathematical Biology

By Dr. Felix Bast | Central University of Punjab, Bathinda

Join Learners enrolled: 967

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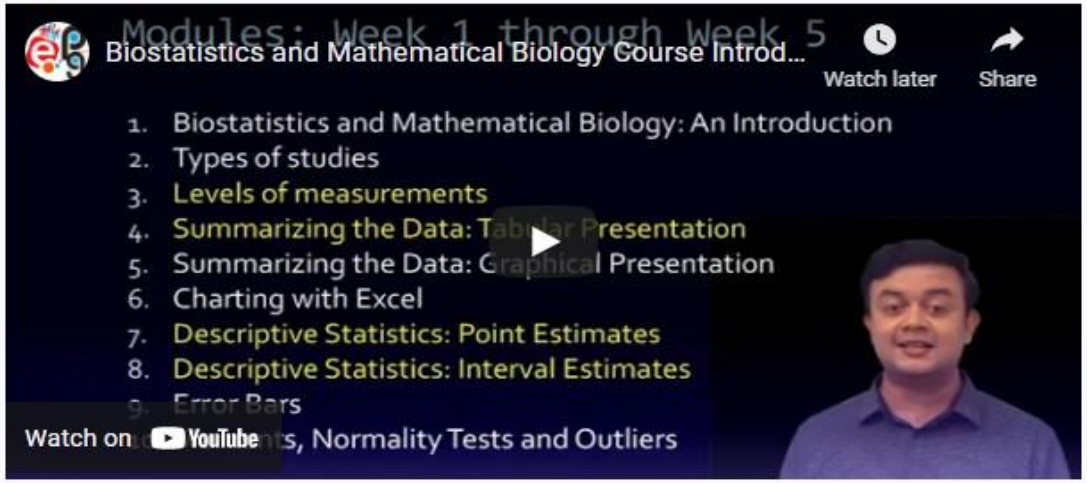

This 12 weeks course will thoroughly cover basic mathematics essential for biologists. Traditional course Biostatistics offered across Indian universities usually do not cover topics such as Bayesian probability, Maximum Likelihood, Box-Plots, Statistical Power and sampling size estimation, Normality and Outlier tests, Non-linear regression and so on; this course is designed such a way to compensate that deficiency. In addition, mathematical skills essential for biologists are covered thoroughly as part of this course, including levels of measurements, permutations and combinations, tests for categorical data including Relative Risk, Odds Ratio and so on. Fun facts and games included in the course is expected to pique interest among the participants. Substantial time is spared to solve practice problems on whiteboard, making the comprehension easy. The course is application oriented and more importance is given for deciding which significance test to use, how to analyse the data and so on using computational softwares rather than manual solutions or using statistical tables.

Summary

Course Status :	Upcoming
Course Type :	Core
Duration :	12 weeks
Start Date :	13 Jul 2021
End Date :	31 Oct 2021
Exam Date :	
Enrollment Ends :	31 Aug 2021
Category :	◦ Biological Sciences & Bioengineering
Credit Points :	3
Level :	Postgraduate

Course layout

\'/eek 1
Biostatistics and Mathematical BiDlogy: An Introduction, Types of studies
\'/eek 2
Levels of measurements Summarizing the Data: Tabular Presentation
\'/eek 3
Summarizing the Data: Graphical Presentation Charting with Excel
*/eek 4
Descriptive statistics: Poirrt Estimates Descriptive Watistics: Interval Estimates Error Bars
y/eek 5
Moments, Normality Tests and Outliers Concepts of Population, Sample and Confidence Interal
*/eek 6
Statistical Hypothesis Testing Statistical Significance and P-Values RelatiDnship b&ween Confidence Intenals and Statistical Significance
*/eek 7
Statistical Power and Choosing the right Sample Size I-Distribution and tests of significance based on I-distribution F-distribution and tests of significance based on F distribUtIDN
\'/eek 8
y2 Distribution and tests of significance based on y2 distribution Comparing Proportions Gaussian, Binomial, Lognormal and Poisson Distributions
\'/eek 9
Pearson's Correlation Simple Linear Regression Non-Linear Regression
\'/eek 10
Nonparametric tests Permutations and Combinations
y/eek 11
Probability Bayes Theorem and Likelihood
*/eek 12
Statistics faith MS Excel and GraphPad Prlsm Key cDncepts of statistics Statistical Pitfalls to Avoid

Books and references

Matulsky, H. (2014). Intuitive biostatistics: a nonmatheinatical guide to statistical thinking. Oxford University Press, USA. *Amazon* link

Van Belle, G., Fisher, L. D., Heagerty, P J., & Lumley, T. (2004). Bioslatistic s. a methDdolagy for the health sciences(Vol. 519). John \'/iley & Sons

I T A Pk\c rm I E. (2016). Introductory biostatistics. John Wiley & Sons.

Instructor

Dr. Felix Baat

Central University Of Punjab, Bathinda

Dr Felix Bast is an award v.'inning teacher and science writer based at Central University of Punjab, Bathinda, Punjab. He is born in Kerala and received his B.Sc with university first rank and gold medal. He received his MSc from University of Madras, and worked at IIT Bombay as CSIR JRF. In 20D5. he was selected under prestigious Monbukagakusho Japanese Government International Doctoral Fellowship and earned his PhD in molecular phylogenetics from MEXT, Japan (Monbukagakusho Japanese Government International Fellow) in 20 1 0.

Courses >

Remote Sensing and GIS

By Prof. Rishikesh Bharti | IIT Guwahati

Join Learners enrolled: 2763

https://onlinecourses.nptel.ac.in/noc21_ce61/preview

This course will introduce the students to the state-of-the-art concepts and practices of remote sensing and GIS. It starts with the fundamentals of remote sensing and GIS and subsequently advanced methods will be covered. This course is designed to give comprehensive understanding on the application of remote sensing and GIS in solving the research problems. Upon completion, the participants should be able to use remote sensing (Satellite images and Field data) and GIS in their future research work.

INTENDED AUDIENCE : UG, PG and PhD Students
PRE-REQUISITES : Nil
INDUSTRY SUPPORT : Esri, Rolta India, RMSI Private Limited, ArcGeosystems

Summary

Course Status :	Upcoming
Course Type :	Core
Duration :	8 weeks
Start Date :	26 Jul 2021
End Date :	17 Sep 2021
Exam Date :	26 Sep 2021 IST
Enrollment Ends :	02 Aug 2021
Category :	Civil Engineering
Credit Points :	2
Level :	Undergraduate/Postgraduate

This is an AICTE approved FDP course

Course layout

Week 1 : Remote Sensinq Data and Conections
Week 2 : Satellite Image Conections
Week J : Digital Image Processing-I
Week 4 : Digital Image Prooessing-II
Week 5 : Thermal and Ivlicrowaw
Week 6 : Imaging 5pectroscopy-I
Week 7 : Imaging 5pectroscopy-II & GIS-I
Week 8 : GIS-II and Application

T ankstotha src x›rt **From** MathWraks, **evolled** students **have** acoass to htATLAB for the d oftha course.

Books and refeences

1. Lillesand, T.M. and Kiefer, R.W., 11B7. Remote sensing and Imaqe Interpretation, John Wiley.
2. Jengert J. R. Introductory digital image processing a remote sensing perspective, Prentice Hall series in geographic information science.
5. Scho›vengerdt, R. A., 2007. Remote Sensing: Models and klethods for Image Processing, Academic Press.
4. Campbell, J.B., 1006. Introduction to Remote tensing, Taylor & Francis, London.
S. Cracknell, P: and Hayes, L IMroduction to remote sensing
6. Jengey J.R., 2DD3. Remote Sensing of the Environrrient an Earth Resource Perspecti 'e, Pearson Education, Del hi.

InZmZor bio

Prof. Rishlka8h Bharti

IIT Guwahat

Rof. Righikesh Bharti is a faculty member at the Depanrnent of Cix'il Engineering Indian Institute of Technology Guwahati. He has been teaching Advanced Remote Sensing, Geohazard Science and Engineering, Advanced Techniques in Geoscience, Engineering Geology Joffre B.Tech, M.Tech and PhD students at IIT Guwa hati. Hydrogeornorpholoqy, Geospatial modelling Sno» and Glacier Studies, Spectroscopy of natural & manmade materials and Advance remote sensing (Hyperspectral and thermal) for the earth and planetary exploration are his major marchinterests. He hope participants will enjoy and learn the proposed course. The details of his research can be found at Website: http:,*,*www.iitg.ac.im'rbhani/'

Animal Physiology

https://onlinecourses.nptel.ac.in/noc21_bt46/preview

By Prof. Mainak Das " IIT Kanpur

Jain **Learners** enrolled: 2069

the course Will be an informal journey to '#nav your own body'. ftwill provoke you to tnin# the follo\vi"ng:

- How our body functions?
- What it is mzde up of and what are the organizational hierarchy of your bodv?
- How its regular functic+i is disrupteo and how the boay tries to restore its normal funnioning?
- How 1:he body ad;usts if un0er extreme physiological situations and hoW it re-calibrates its fioictions?

Summary

Course Status :	Upcoming
Course Type:	Core
Duration :	12 weeks
Stan Date:	26 Jul 2021
End Date :	15 Oct 2021
Exam Oate :	24 Oct 2021 UT
Enroll merrt Ends	02 Aug 2021
Category :	+ BiOtDL}lCdl (9flC9S & Bioengineering
Cradit Points:	3
Level :	Undergraduate/Postgraduate

This is an AICTE approved FDP course

Course layout

Weeh 1: Imroduction
Weeh 2: Skeletal svstem
Weeh J: Muscles
Weeh 4: Neural gystem
Weeh 5: Neural gystem
Weeh 6: Neural gystem
Weeh 7: Neural gystem
Weeh 8: Neural gystem and Special senses
Wnoh 9. Neural system and Special senses
Wnoh 1d: Cardiovascular system
Wnoh 11: Respiratory and Blood
WnBi 12 Endocrine, Digestive. Blood, Kidnp'. and Reprod•uctive system

Books and references

- Guyton and HzII Textbook of Medical Physiology
- Garong'5 Rey of Med Physiology
- Fundamentals of anatomy and physiol by Martini

Incmctar bio

Prof. Malnak Das

lfT Kanpur

Pror.uainak Das is a faculty of IIT Kanpur India in the department of biological sciences & bioengineering since April 26 201B. He did his bachelors degree f1989-1994, in agricukure from College of Agricukure Indore. Thereafter he did his post qraduate degree i'19941997› in animal physiology from National Dairy Research Institute Kamal India. Following his post graduate studies, he worked as researcher in IISc Bangalore India (-!997-1199}. University of Neuchstel. S 'ioerland (1999-2d00), University of Clemson, LICA (20BB-2004'i and in diversity of Central FIGFIda, USA (2gd42010). He did his doctoral studies from College of k4edicine of University ol Central Florida (2004-2B08), vAile working as a full time employee of the university. He introduced the regular physi'ology course for the PG students in IIT Kanpur in 2fl11. He has wide interest in phvsioiogy, sensors. energy and bioeiectronics and maintains an active research team at IT KanDur, India. Prof. Das has been '.vorkinq on cell culture technologies, serum free medium Velopment and defined cell culwre systems for last 20 wars. He has expertise in long ta m culturing of excitable cells. His doc1:oral thesis is a complex problem of modern ceil culture technology. titled:'Tissue Engineering The Moton=uron To Muscle Segmem Df The Stretch Reflex Arc Circuit tttilizing Micro-fabrication,lMerface Design And Wfined Medium Formulation'.

Annexure IIIa

GU-ART Syllabus - Zoology

1. **DIVERSITY OF NON-CHORDATES**

- Protozoa
- Porifera
- Cnidaria
- Platyhelminthes
- Nematoda
- Annelida
- Arthropoda
- Mollusca
- Echinodermata

2. **DIVERSITY OF CHORDATES**

- Protochordata
- Hemichordates
- Agnatha
- Pisces
- Amphibia
- Reptiles
- Aves
- Mammals

3. **CELL BIOLOGY**

- General organization of Prokaryotic cells and Eukaryotic cells
- Cell Environment
- Cell Organelles

4. **GENETICS**

- Mendelian Genetics & its Extension
- Chromosome Structure and aberrations
- Gene Mutation
- Inheritance of Human traits

5. **CHORDATE ANATOMY**

- Integumentary System
- Skeletal System
- Digestive System
- Respiratory System
- Circulatory System

- Urinogenital System
- Nervous System

6. ANIMAL PHYSIOLOGY

- Digestion
- Respiration
- Renal Physiology
- Cardiovascular Physiology
- Muscle Physiology

7. **BIOCHEMISTRY**

- pH and buffer
- Structures and function of Carbohydrates
- Structures and function of Lipids
- Structures and function of Proteins
- Enzymes nomenclature and kinetics

8. METABOLIC PROCESSES

- Overview of Metabolism
- Bioenergetics and Oxidative Phosphorylation
- Carbohydrate Metabolism (glycolysis, gluconeogenesis, glycogenolysis, glycogenesis)
- Amino acid metabolism (formation of ammonia, urea cycle, ketogenic acid, glucogenic acid)
- Lipid Metabolism (beta oxidation of fatty acids)

9. ENDOCRINOLOGY

Endocrine glands, their hormones and functions:

- Hypothalamus
- Hypophysis
- Thyroid
- Pancreas
- Adrenal

10. MOLECULAR BIOLOGY AND EVOLUTION

- DNA Replication
- Transcription
- Translation and Post-Translational Modifications
- Concept of Evolution, Origin of Life and speciation
- Isolation and Adaptation

Annexure IIIb

Syllabus of Ph.D. Entrance Test (Zoology)

Animal Taxonomy and Systematics

Principles and rules of taxonomy, Zoological nomenclature, ICZN regulations; Concept of speciation: Biological, Phylogenetic and Evolutionary; Molecular basis of animal taxonomy: Genetic polymorphism, electrophoretic variations, amino acid sequencing for variety of proteins, DNA-DNA and DNA-RNA hybridization; Phylogenetics: Introduction; Basic terminology, Homology: Convergence, parallelisms and reversals.

Biodiversity

Geographic Distribution of Biological Diversity, Gradients of Spatial Distribution, Endemism, Keystone species, Decline of global biodiversity, Functional diversity and ecosystem functioning. The economics of biodiversity and ecosystem function. Laws and policies for biodiversity conservation.

Anatomy of Non chordates

Locomotory organs in Annelida and Mollusca; Circulatory system, Nervous system, Respiratory system of Annelida, Arthropoda and Mollusca

Comparative Anatomy of Chordates

Axial and Appendicular skeleton & musculature of chordates, Excretory system of tetrapod, Circulatory system of vertebrates. Gonads in anaminiotes and amniotes.

Animal Biochemistry

Structures and functions of carbohydrates, proteins and lipids; Enzyme kinetics and inhibition; Catalytic and Regulatory strategies of Enzymes; Concept of metabolism, Free energy change, Oxidative phosphorylation; Glycolysis, Gluconeogenesis, Glycogen metabolism, Fatty acid biosynthesis, β oxidation of fatty acids, Nucleic acid biosynthesis.

Molecular Biology

Structure of nucleic acids; Regulation of replication, transcription, translation of genes in prokaryotes and eukaryotes: DNA damage and repair mechanisms: Cell cycle and apoptosis.

Comparative physiology of animals

Physiology of digestion, excretion, respiration; Circulation, Muscle physiology, chemoreception.

Advanced developmental biology

Gametogenesis, Molecular events in mammalian fertilization; Cleavage and gastrulation; Induction and competence; Specification of body axes in insect, amphibian, avian and mammalian embryo; Pattern formation of vertebrate limb and coordination of various axes.

Ecology

Physical environment; Biotic environment; Biotic and Abiotic interactions, Habitat and Niche, Ecological structure, Population Ecology, Community Ecology, Ecological energetics, Intra-specific and Inter-specific interactions, Trophic ecology, Trophic cascades, Bioaccumulation and Biomagnification. Ecological Succession, Biogeography, Restoration ecology, Biomanipulation, Bioremediation and Biological augmentation strategies, Molecular ecology, molecular approach to behavioural ecology and conservation genetics.

Animal Genetics

Chromosomal Genetics, Autosomal recessive disorders, Autosomal dominant disorders, X-linked recessive disorders, X linked dominant disorders, Y-linked disorders; Cancer Genetics, Mapping genomes, Genetic applications in Fishes, Livestock and Wildlife, Gene editing in livestock.

Toxicology

Branches of toxicology, Classification of Toxicants (based on Source, Use, Target organ), Reactivity, Absorption, Distribution, Biotransformation and Elimination of Toxicants, Toxic actions /mechanism (Acute, Sub-chronic and Chronic).

Biostatistics

Sampling Types, Types of Variables, Difference between Primary and Secondary Data, Data representation, Type I and II Errors, Mean, Measure of Variability, Standard deviation, Kurtosis, Correlation, Regression, Probability distributions, Test of Hypothesis.

Aquaculture

Fish diversity: Fish Classification and diversity of freshwater and Marine fishes of India. Fish Reproduction: Sexual maturity and breeding season of various cultivable species; Development of gametes in male and female; Endocrine control of fish reproduction. Different type of fish culture practices, Fish diseases, Immune response to pathogens. Management of fish firm: Fin Fish hatchery: Freshwater and marine fish seed resources; Shell fish hatchery: Natural seed resources; collection methods and quality of seeds. Post-Harvest Technology: Principles and importance of fish preservation. Fish spoilage-post mortem changes and rigor mortis, post rigor spoilage. Fish and fishery microbiology: Microflora of aquatic environment. Autotrophic and heterotrophic microorganisms in aquatic environment.

or

Life processes

Nature and levels of adaptation, Mechanism of adaptation; Cellular metabolism: regulation and homeostasis; Concept of stress and strain in animal; Circadian rhythm: Behavioural and autonomous rhythm; Endogenous mechanism of rhythm; Homeostasis and circadian rhythmicity. Review of classification of neurons and their functions; Blood brain barrier and its physiological importance, CSF composition, formation and drainage; Types of synaptic connection and their conduction physiology: Axosomatic, axodendritic, Dendrodendritic and Axoaxonal synapses. Basic Biology of stem cells; Cellular Mechanisms of Stem Cells;

Molecular basis of pluripotency, stem cell niche, cell cycle regulators in stem cells, mechanisms of stem cell self-renewal.

or

Wildlife Biology

Avian morphology, anatomy and physiology: Review of bird as glorified reptile, Avian flight (forms, Mechanism and energetics), Bird vocalization-anatomy of vocal organ, Neurophysiology of song control system. Bird identification, systematics, molecular taxonomy. Bird migration; nesting patterns of bird, Ecosystem services provided by birds, Applied ornithology. Herpetology- Diversity of Amphibians and Reptiles and their shared characteristics. Systematics and Diversity of Extant Amphibians and Reptiles. Venom and Venom-delivering structures. Important Indian fauna and their distribution, Protected Areas, Endemic species; IUCN red list: Extinct species of India, Endangered, Threatened, Least concern and Critically Endangered. Wildlife Trade and Crime: Wildlife products CITES, TRAFFIC, Wildlife Crime Control Bureau in India, Wildlife Forensic.