



હેમચંદ્રાચાર્ય ઉત્તર ગુજરાત યુનિવર્સિટી

NAAC A (3.02) State University

પો.બો.નં.-૨૧, યુનિવર્સિટી રોડ, પાટણ (ઉ.ગુ.) ૩૮૪૨૬૫

ફોન: (૦૨૭૬૬) ૨૩૭૦૦૦

ફેક્સ : (૦૨૭૬૬) ૨૩૧૯૧૭

Email : regi@ngu.ac.in

Website : www.ngu.ac.in

પરિપત્ર ક્રમાંક - ૨૬૬ / ૨૦૧૯

વિષય :- વિજ્ઞાન વિદ્યાશાખાના જૂલોજી વિષયના અનુસ્નાતક કક્ષાના સેમેસ્ટર-૧ અને ૨ ના નવા અભ્યાસક્રમ અંગે...

સંદર્ભ :- પરિપત્ર ક્રમાંક : ૪૪/૨૦૧૯

આ યુનિવર્સિટીના લાઈફ સાયંસ વિભાગના અધ્યક્ષશ્રી તથા સંલગ્ન વિજ્ઞાન વિદ્યાશાખાની તમામ કોલેજોના આચાર્યશ્રીઓને જણાવવાનું કે, આ યુનિવર્સિટીના તારીખ : ૧૪/૦૩/૨૦૧૯ ના પરિપત્ર નંબર - ૪૪/૨૦૧૯ , જાવક નંબર- એકે/અ×સ/૧૦૧૬૩/૨૦૧૯ થી જૂલોજી વિષયનો સેમેસ્ટર-૧ થી ૪ નો અનુસ્નાતક કક્ષાનો અભ્યાસક્રમ પરિપત્રીત કરેલ છે, જેમાં લાઈફ સાયંસ વિભાગના અધ્યક્ષશ્રીને સોંપવામાં આવેલ જવાબદારી અન્વયે તેઓશ્રીએ સુધારા સૂચવતો રજૂ કરેલ નવો એમ.એસસી. જૂલોજીનો સેમેસ્ટર-૧ અને ૨ નો સામેલ પરિશિષ્ટ પ્રમાણે નો સુધારેલ અભ્યાસક્રમ / સ્કીમ જૂન-૨૦૧૯ થી ક્રમશઃ અમલમાં આવે તે રીતે એકેડેમિક કાઉન્સિલવતી માન.કુલપતિશ્રીએ મંજૂર કરેલ છે. જેનો અમલ થવા સારૂ સંબંધિતોને આથી આ સાથે મોકલવામાં આવે છે.

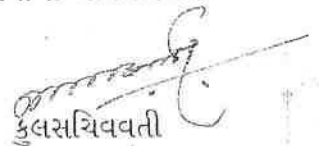
આ બાબતની સંબંધિતોને આપના સ્તરેથી જાણ કરવા વિનંતી છે.

નોંધ: (૧) વિદ્યાર્થીઓની જરૂરીયાત માટે પરિપત્રની એક નકલ કોલેજ / વિભાગના ગ્રંથાલયમાં મૂકવાની રહેશે.

(૨) આ પરિપત્ર યુનિવર્સિટીની વેબ સાઈટ www.ngu.ac.in પર પણ ઉપલબ્ધ કરાવવામાં આવનાર છે.

નં.-એ કે / અ× સં / ૪૪૨૬ / ૨૦૧૯

તારીખ: ૪/૦૯/૨૦૧૯


કુલસચિવવતી

પ્રતિ

૧. અધ્યક્ષી, લાઈફ સાયંસ વિભાગ , હેમ. ઉ.ગુ.યુનિવર્સિટી, પાટણ
૨. સંલગ્ન સાયન્સ કોલેજોના આચાર્યશ્રીઓ
૩. અધ્યક્ષશ્રી/ કો. ઓર્ડીનેટરશ્રી-વિજ્ઞાન વિદ્યાશાખા અંતર્ગત વિષયોના અનુસ્નાતક વિભાગો, હેમ. ઉ.ગુ. યુનિવર્સિટી, પાટણ.
૪. ડૉ. એમ. બી. પ્રજાપતિ (ડીનશ્રી), ગણિતશાસ્ત્ર વિભાગ , હેમ. ઉ.ગુ. યુનિવર્સિટી, પાટણ.
૫. પરીક્ષા નિયામકશ્રી, હેમચંદ્રાચાર્ય ઉત્તર ગુજરાત યુનિવર્સિટી, પાટણ. (પાંચ નકલ)
૬. ગ્રંથપાલશ્રી, હેમ.ઉત્તર ગુજરાત યુનિવર્સિટી, પાટણ. (વિદ્યાર્થીઓના ઉપયોગ સારૂ રેકર્ડ ફાઈલ માટે)
૭. સિસ્ટમ એનાલીસ્ટશ્રી, કોમ્પ્યુટર (રીઝલ્ટ) સેન્ટર, હેમ.ઉ.ગુ.યુનિવર્સિટી, પાટણ. તરફ પરિણામ માટે તથા વેબસાઈટ પર મૂકવા સારૂ.
૮. અનુસ્નાતક પ્રશાખા (એકેડેમીક શાખા) હેમચંદ્રાચાર્ય ઉત્તર ગુજરાત યુનિવર્સિટી, પાટણ.
૯. મુખ્ય હિસાબી અધિકારીશ્રી (મહેકમ), હેમચંદ્રાચાર્ય ઉત્તર ગુજરાત યુનિવર્સિટી, પાટણ તરફ → પરિપત્રની ફાઈલ અર્થે
૧૦. સિલેક્ટ ફાઈલે. (૨ નકલ)

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

NAAC A (3.02) State University

PATAN- 384265

Faculty of Science

M. Sc. Zoology

Syllabus/ scheme

Sem. – 1



Sem./CBCS/Grading pattern

w. e. f. June-2019

Date: 01/08/2019

Total page: 27

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY PATAN	
M. Sc. (Zoology) CBCS Syllabus 2019	
Document code	Syllabus ZOO- 2019
Name of faculty	Science
Faculty code	SCI
Programme name	ZOOLOGY
Programme code	ZOO
Effective from	June-2019

The proposed new structure for M. Sc. course is based on Choice Based Credit System (CBCS) which is in force June-2019.

CBCS Course Pattern

1. This programme is divided into **Four Semesters** (Two Years). The duration of an academic year consists of two semester, each of 15 weeks for teaching. The academic session in each semester will provide 90 teaching days. Each semester has 24 credit and the programme is comprised of total 96 credits.
2. There will be three categories of courses/papers in this programme:
 - A. Four Compulsory – **Core** theory **courses** with 4 credits each in every semester.
 - B. One choice based elective course (disciplinary/interdisciplinary) with 2 credits in each semester.
 - C. Two practical each of 3 credits in each semesters.
 - D. In the semester IV, courses similar to the above A, B, C and / or Dissertation work;
3. Detailed course pattern for each semester is given below.

Note:

1. For four credit course: each syllabus is of 4 units having equal weightage.
2. For two credit course: each syllabus is of 2 units having equal weightage.
3. For question paper of 70 marks: each question paper shall have 2 sections and having 3 questions each.

Section I	Must be drawn from Unit 1 and 2
Q. 1	One long question of 14 marks OR two short questions of 7 marks each from Unit 1.
Q. 2	One long question of 14 marks OR two short questions of 7 marks each from Unit 2.
Q. 3	Short questions of 7 marks from Unit 1 & 2
Section II	Must be drawn from Unit 3 and 4
Q. 4	One long question of 14 marks OR two short questions of 7 marks each from Unit 3.
Q. 5	One long question of 14 marks OR two short questions of 7 marks each from Unit 4.
Q. 6	Short questions of 7 marks from Unit 3 & 4

4. For question paper of 35 marks: each question paper shall have 3 questions: Q-1 from unit-1 of 15 marks, Q-2 from unit-2 of 15 marks and Q-3 is of objective type having 05 marks from all the units of the paper.

Section I	Must be drawn from Unit 1
Q. 1	Two long question of 15 marks OR three short questions of 5 marks each from Unit 1.
	Must be drawn from Unit 2
Q. 2	Two long question of 15 marks OR three short questions of 5 marks each from Unit 2.
Q. 3	Short questions of 5 marks from Unit 1 & 2

M. Sc. Semester I

Course	Course code	Paper title	Exam duration (Hours)	External marks	Internal marks	Total marks	Teaching hours per week	Credit points
Paper-I	ZOCC-101	Cell Biology	2.30	70	30	100	4	4
Paper-II	ZOCC -102	Molecular Biology and Genetics	2.30	70	30	100	4	4
Paper-III	ZOCC -103	Biodiversity and Ecology	2.30	70	30	100	4	4
Paper-IV	ZOCC -104	Animal Taxonomy-1	2.30	70	30	100	4	4
Practical Paper-I	ZOOPR-101	Cell Biology, Molecular Biology and Genetics	More than 4 hours	75		75	6	3
Practical Paper-II	ZOOPR-102	Biodiversity, Ecology and Animal Taxonomy-1	More than 4 hours	75		75	6	3
Elective Course	ZOOEC-101 OR ZOOEC-102 OR ZOOEC-103	Wildlife and Conservation Biology - 1 Fisheries and Aquaculture -1 Environmentally Sound Technologies-1	2.00	35	15	50	2	2
Total				465	135	600	30	24

ZOCC-101: CELL BIOLOGY

UNIT I– Cell and cell organells-1

- Cell wall: Structure and functions; Plasmodesmata: Structure; role in movement of molecules and macromolecules; comparison with gap junctions.
- Plasma membrane: Structure, models, and functions; sites for ATPases, ion carriers, channels and pumps; receptors.
- Structural organization and function of intracellular organelles: Plastids, Mitochondria, Chloroplast, Golgibodies, Lysosomes, Peroxisomes, Endoplasmic reticulum, Ribosomes
- Cytoskeleton- microtubules, microfilamenets and intermediate filaments.

UNIT II– Cell and cell organells-2

- Nucleus: Structure and functions; nuclear pores; nucleosome organization, Nucleolus.
- Chromatin organization: Chromosome structure and packaging of DNA, molecular organization of centromere and telomere.
- Specialized types of chromosomes: Structure and functions of polytene and lampbrush, B-chromosomes and sex chromosomes.
- Experimental approaches for studying cells, Cell Fixation and Staining

UNIT III– Cell division and signaling

- Cell division and cell cycle: Mitosis and meiosis, their regulation, steps in cell cycle, regulation and control of cell cycle
- Cell Signaling: Cell signaling Hormones and their receptors, cell surface receptor, signaling through G-protein coupled receptors, signal transduction pathways, second messengers, regulation of signaling pathways
- Cellular communication: General principles of cell communication, cell adhesion and roles of different adhesion molecules, gap junctions, extracellular matrix, integrins, regulation of hematopoiesis, neurotransmission and its regulation,
- Apoptosis and Programmed Cell Death (PCD).

UNIT IV– Cytology of cancer

- Introduction to cancer biology
- Cancer development: Genetic rearrangements in progenitor cells, oncogenes, tumor suppressor genes, cancer and the cell cycle, virus-induced cancer.
- Cancer propagation: Metastasis, interaction of cancer cells with normal cells.
- Cancer treatment: Therapeutic interventions of uncontrolled cell growth.

References

1. Lodishet. al., 2007 Molecular Cell Biology, W.H. Freeman and Company, New York, USA 2.
2. Albertset. al., 2008 Molecular Biology of the Cell, Garland Science, Taylor & Francis Group, New York, USA. 3.
3. Sperelakis 2001 Cell Physiology Source Book : A Molecular approach, Academic Press, New York, USA.
4. Powar C. B. 1983 Cell Biology, Himalaya Publishing House, Mumbai, India.

ZOCC-102: MOLECULAR BIOLOGY AND GENETICS

UNIT I– Molecular Biology-1

- Nucleic Acids: Composition of Nucleic Acids and Synthesis of Nucleotides; Molecular Organization and types of DNA and RNA.
- DNA Replication in Prokaryotes and Eukaryotes; Enzymes involved in Replication.
- Transcription in Prokaryotes and Eukaryotes; RNA Polymerases.
- Translation: Process of Protein synthesis.

UNIT II– Molecular Biology-2

- Regulation of gene expression in Prokaryotes and Eukaryotes.
- Recombinant DNA technology: Classification of Restriction enzymes, Gene Cloning principles and technique
- Prokaryotic and Eukaryotic cloning Vectors. Construction of Genomic and cDNA libraries, DNA synthesis and sequencing.
- PCR (Polymerase Chain Reaction), DNA Finger printing and DNA Microarray

UNIT III– Genetics-1

- Gene structure and expression: Gene vs allele, a new concept of Allelomorphism, fine structure of gene, cistron, recon and muton.
- Genetic code: Deciphering genetic code, properties of genetic code, initiation and termination codons, mutation
- Wobble hypothesis, new genetic codes, second genetic code, overlapping and split genes.
- Extra chromosomal inheritance: Male sterility-origin, induction and application, inheritance of chloroplast and mitochondrial gene

UNIT IV– Genetics-2

- Spontaneous and induced mutation, Physical and chemical mutagens; Molecular basis of gene mutations
- Transposable elements in Prokaryotes and Eukaryotes; mutations induced by transposons; site-directed mutagenesis
- Principal of Mendelian Genetics and Hardy – Weinberg genetic equilibrium
- Factors affecting gene frequency – Natural selection and Genetic polymorphism and Genetic drift.

References

1. Lodishet. al., 2007 Molecular Cell Biology, W.H. Freeman and Company, New York, USA 2.
2. Sambamurty A.V. S. S. 2008 Molecular Biology, Narosa Publishing House, New Delhi.
3. Sandhu G. S. 2002 Molecular Cell Biology, Campus books, New Delhi.
4. Verma P. S. and Agrawal V. K. 2010 Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, S. Chand & Company Ltd.

ZOCC-103 BIODIVERSITY AND ECOLOGY

UNIT I– Organization of biological diversity

- Biogeography of the world and basis of biological diversity
- Levels of biodiversity: Species, Genetic and Ecosystem diversity
- Biodiversity hotspots of the world
- Conservation significance and threats to biodiversity

UNIT II– Strategies of Biodiversity conservation

- Ecological services of Biodiversity
- IUCN threat categories, Red data book, and role in biodiversity conservation
- National Biodiversity Act (2002)
- Role of National Parks and Sanctuaries in biodiversity conservation in India

UNIT III– Principle and concept of Ecosystem

- Classical ecological concepts and laws
- Concept of productivity, food chain, food web and trophic levels
- Habitat and niches, niche width and overlap; fundamental and realized niche; resource partitioning; character displacement
- Ecological succession

UNIT IV– Population and Community Ecology

- Characteristics of a population; population growth curves and regulation;
- r and K selection; concept of Metapopulation.
- Population and Community dynamics and regulations
- Population genetics: genetic variation, speciation

References

1. Magguran, A.E. (1996). Ecological diversity and its measurements. Princeton University.
2. Gadgil, M. (2002) A methodology manual for scientific inventorying, monitoring and conservation of Biodiversity.
3. Odum. E.P. 1996 Fundamentals of Ecology. Nataraj Publishers, Dehra Dun.
4. Smith, R.L.1986. Elements of Ecology. Harpet and Row Publishers, New York.
5. Berwer. A.1988 .The Science of ecology. Saunder's college publishing.

ZOCC-104 ANIMAL TAXONOMY -1

UNIT I– Introduction to animal body

- Grades of organization in animal body complexity
- Animal body plans
- Body cavity and formation of germ layers
- Components of metazoan body

UNIT II– Classification of animals

- History of classification
- Species concept
- Major subdivisions of animal kingdom
- Classification, characteristics and diversity of Protozoan.

UNIT III- Classification of non chordates-1 (up to classes)

- Introduction to non-chordate phylums
- Classification, characteristics and diversity of Porifera
- Classification, characteristics and diversity of Cnidaria
- Classification, characteristics and diversity of Platyhelminthes
- Classification, characteristics and diversity of Mollusca

UNIT IV- Introduction to chordates

- Introduction to chordate characteristics
- Ancestry and evolution of chordates
- Classification of chordates (upto class)
- Classification, characteristics and diversity of subphylum urochordata and cephalochordata

References

1. Hickman C. P., et al. 2006 Integrated principals of Zoology, McGraw Hill Higher Education. 931pp. 14th edition.
2. Pechnik J. A. 2015 Biology of the Invertebrates, McGraw Hill Higher Education. 555 pp. 7th edition.
3. Jordan E. L. and Verma P. S. 1993 Invertebrate Zoology, S. Chand publishing. New Delhi.
4. EkambaranathaAyyar, M. and T.N. Ananthakrishnan, 1992 Manual of Zoology Vol. 1 (Invertebrata), parts I and II.S. Viswanathan (Printers and Publishers) Pvt. Ltd; Madras. 2.
- 5.

ZOOEC-101 WILDLIFE AND CONSERVATION BIOLOGY - 1

UNIT I

- Wildlife: Definition, Scope and wildlife as natural resource
- Conservation: Definition, History and Background and types of conservation
- Significance of wildlife conservation
- Wildlife habitats in Indian subcontinent

UNIT II

- Wildlife management (History and current advances)
- Protected areas and role of PAs in wildlife conservation
- Community and conservation
- Current wildlife conservation practices in India

References

1. Sinclair A. R., Fryxell J M and Caughly G. (2006) Wildlife Ecology, Conservation and Management. Blackwell Publishing, U.S.A.
2. Gopal R. (1992) Fundamentals of Wildlife Management. Justice Home, Allahabad, India.
3. Jairajpuri M. S. (1990) Collection and preservation of animals. Zoological Survey of India.
4. Magguran, A.E. (1996). Ecological diversity and its measurements. Princeton University.
5. Gadgil, M. (2002) A methodology manual for scientific inventorying, monitoring and conservation of Biodiversity
6. Hickman C. P., et al. 2006 Integrated principals of Zoology, McGraw Hill Higher Education. 931pp. 14th edition.

ZOOEC-102 FISHERIES AND AQUACULTURE -1

UNIT I

- Introduction to fisheries biology
- External morphology of fish
- General characters and classification of fishes
- Structural and functional adaptation of fishes

UNIT II

- History, scope and types of aquaculture
- Status of aquaculture in India
- Fishing crafts and gears
- Cultivable fauna and flora in aquaculture

References

1. Day, F. 1981. Fishes of India, Vol.I and Vol. II. William Sawson& Sons Ltd., London. 2.
2. Jhingran, C.G. 1981. Fish and Fisheries of India. Hindustan Publishing Co., India.
3. Maheswari, K. 1993. Common fish diseases and their control. Institute of Fisheries Education, Powakads, M.P.
4. Santhanam,R. 1980. Fisheries Science. Daya Publishing House, New Delhi.
5. Yadav, B.N. 1997. Fish and Fisheries. Daya Publishing House, New Delhi
6. FAO Volumes for fish identification.
7. Bal D.V. and Rao, K.V. 1990. Marine Fisheries of India. Tata McGraw Hill Publishing Co. Ltd., New York.
8. Biswas, K. P. 1996. A Text Book of Fish, Fisheries and Technology. Narendra Publishing House, Delhi.
9. Srivastava, C.B.L. 1999. Fish Biology. Narendra Publishing House, Delhi.

ZOOEC-103 ENVIRONMENTALLY SOUND TECHNOLOGIES-1

UNIT I

- Overview of sustainable development
- Need and significance of sustainable development
- Barriers of sustainable development
- Categories and measurable benefits of sustainable development

UNIT II

- Environmentally sound technologies for pollution control
- Environmentally sound technologies for water conservation
- Environmental technology assessment
- Environmentally sound technologies for future challenges

References

1. Caldwell, Lynton K., "An Ecological Approach to International development: Problems of Policy and Administration", in Farvar, M. Taghi and John P. Milton, eds, *The Careless Technology: Ecology and International Development*, Garden City, N.J., Natural History Press, 1972.
2. Clark, W.C., and R.E. Munn, eds, *Sustainable Development of the Biosphere*, Cambridge, the Press Syndicate of the University of Cambridge, 1986.
3. Milbrath, Lester W., *Envisioning a Sustainable Society*, Albany, State University of New York Press, 1989.
4. *Work-Book for Training in Environmental Technology Assessment for Decision-Makers: A Pilot Programme*, Technical Publication Series [5], UNEP International Environmental Technology Centre, Osaka/Shiga, 1997.
5. Falkenmark M, Lindh G. 1976. *Water for a starving world*. Westview Press, Boulder, CO, USA.
6. Falkenmark M, Rockström R. 2004. *Balancing water for humans and nature: The new approach in ecohydrology*. Earthscan Publications, London.

ZOOPR-101 CELL BIOLOGY, MOLECULAR BIOLOGY AND GENETICS

Cell Biology

1. Isolation of mitochondria from given sample
2. Mitosis and the Cell Cycle in Onion Root-Tip Cells
3. Preparation of Buccal smear and Identification of Barr Body
4. Micrometry – Measurement of cell size
5. To measure mitotic index in tissue provided
6. To perform gram staining for identification of gram positive and gram negative bacteria

Molecular Biology and Genetics

7. Spectrometric analysis of DNA
8. Estimation of RNA by Orcinol method
9. Preparation of Drosophila Polytene Chromosome Squashes
10. Construction of normal human karyotype
11. Diagnosis of genetical disorders using karyotypes
12. To study test cross and back cross inheritance related genetic problems
13. Study of human pedigree analysis

ZOOPR-102 BIODIVERSITY, ECOLOGY AND ANIMAL TAXONOMY-1

Biodiversity and Ecology

1. Determination of different population parameters:
 - a. Density
 - b. Abundance
 - c. Frequency of occurrence
 - d. Dominance
2. Species-area curve method
3. Study of population dynamics using examples
 - a. Population growth rate
 - b. Carrying capacity**
 - c. Population doubling time**
4. Study and determination of physical and chemical properties of soil
5. Study and determination of physical and chemical properties of water
6. Calculation of similarity and diversity indices for given data
7. Mapping of faunal diversity found in different zoogeographical realms
8. Mapping of protected area and distribution of endangered fauna of India

Animal Taxonomy-1

1. Study of general body organization
2. Study of Classification of protozoans using laboratory specimens.
3. Study of Classification of porifera using laboratory specimens.
4. Study of Classification of cnidaria using laboratory specimens.
5. Study of Classification of platyhelminthes using laboratory specimens.
6. Study of Classification of mollusca using laboratory specimens.
7. Study of Classification of urochordata and cephalochordata using laboratory specimens.