



હેમચંદ્રાચાર્ય ઉત્તર ગુજરાત યુનિવર્સિટી

NAAC A (3.02) State University

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

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પરિપત્ર ક્રમાંક – ૧૬૬ / ૨૦૨૦

વિષય :— એમ.એસસી. – ઈન્ટ્રીગેટેડ (લાઈફસાયન્સ) નો સેમેસ્ટર – ૧ અને ૨ ના અભ્યાસક્રમ અંગે..

આ યુનિવર્સિટીના લાઈફસાયન્સ વિષયના અનુસ્નાતક વિભાગના અધ્યક્ષશ્રીને જણાવવાનું કે, લાઈફસાયન્સ વિષયની અભ્યાસ સમિતિએ ભલામણ કર્યાનુસાર વિજ્ઞાન વિદ્યાશાખા અંતર્ગત એમ.એસસી.— ઈન્ટ્રીગેટેડનો સેમેસ્ટર – ૧ અને ૨ નો સામેલ પરિશિષ્ટ પ્રમાણનો અભ્યાસક્રમ **જૂન – ૨૦૨૦ થી ક્રમશઃ અમલમાં આવે તે રીતે** વિદ્યાશાખા / એકેડેમિક કાઉન્સિલવતી માન.કુલપતિશ્રીએ મંજૂર કરેલ છે. જે સંબંધિત સર્વેની જાણ તથા અમલ સારૂ આ સાથે મોકલવામાં આવે છે.

નોંધ: (૧) વિદ્યાર્થીઓના ઉપયોગ સારૂ પરિપત્રની એક નકલ ડિપાર્ટમેન્ટ ના ગ્રંથાલયમાં મૂકવાની રહેશે.

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

સહી/—

અધ્યક્ષ

કુલસચિવવતી

બિડાણ : ઉપર મુજબ

નં.—એ કે / અ× સ / ૨૫૩૩ / ૨૦૨૦

તારીખ : ૧૧ / ૦૯ / ૨૦૨૦

પ્રતિ,

૧. અધ્યક્ષશ્રી , લાઈફસાયન્સ ડીપાર્ટમેન્ટ , હેમ. ઉ.ગુ. યુનિવર્સિટી, પાટણ.
૨. ડૉ. એમ. બી. પ્રજાપતિ (ડીનશ્રી – વિજ્ઞાન વિદ્યાશાખા), ગણિતશાસ્ત્ર ભવન, હેમ. ઉ.ગુ. યુનિવર્સિટી, પાટણ.
૩. પરીક્ષા નિયામકશ્રી, હેમચંદ્રાચાર્ય ઉત્તર ગુજરાત યુનિવર્સિટી, પાટણ. (પાંચ નકલ)
૪. ઓફિસરશ્રી ઈનચાર્જશ્રી, સબ સેન્ટર, ખેડબ્રહ્મા કેમ્પસ, મુ. –વડાલી, જિ. – સાબરકાંઠા. (હેમ.ઉત્તર ગુજરાત યુનિવર્સિટી, પાટણ.)
૫. ગ્રંથપાલશ્રી, હેમ.ઉત્તર ગુજરાત યુનિવર્સિટી, પાટણ. (વિદ્યાર્થીઓના ઉપયોગ સારૂ રેકર્ડ ફાઈલ માટે)
૬. સીસ્ટમ એનાલીસ્ટ, રીઝલ્ટ સેન્ટર, હેમ.ઉ.ગુ. યુનિવર્સિટી, પાટણ તરફ પરિણામ માટે તથા વેબસાઈટ પર મૂકવા સારૂ.
૭. પ્રવેશ પ્રશાખા (એકેડેમિક શાખા) હેમચંદ્રાચાર્ય ઉત્તર ગુજરાત યુનિવર્સિટી, પાટણ.
૮. અનુસ્નાતક પ્રશાખા(એકેડેમિક 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. in Life Sciences
(5 years Integrated Programme)**

Syllabus/ scheme

Sem. – 2



Sem./CBCS/Grading pattern

w. e. f. June-2020

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY PATAN	
M. Sc. in Life Sciences (5 Years Integrated Programme) CBCS Syllabus 2020	
Document code	Syllabus IPLFSc- 2020
Name of faculty	Science
Faculty code	SCI
Programme name	M. Sc. in Life Sciences (5 Years Integrated Programme)
Programme code	IPLFSc
Effective from	June-2020

1. The proposed new structure for M. Sc. in Life Sciences (**5 Years Integrated Programme**) course is based on Choice Based Credit System (CBCS) which is in force June-2020.

CBCS Course Pattern

2. This programme is divided into **Ten Semesters** (Five 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 credits and the programme is comprised of total 240 credits.
3. There will be five categories of courses/papers in this programme: CC- Core Course, PC- Practical Core, EG- Elective Generic, ES- Elective Subject and AEC- Ability Enhancement Course.
4. The theory courses with 4 credits shall have 60 hrs of direct classroom teaching workload (15 weeks × 4). The theory courses with 3 credits shall have 45 hrs of teaching workload (15 weeks × 3) and the theory courses with 2 credits shall have 30 hrs of teaching workload (15 weeks × 2).

Attendance: The attendance rules will be as per the rules and regulation of Hemchandracharya North Gujarat University, Patan.

Medium of Instruction: The medium of instruction shall be English.

Structure of question paper :

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 (4 credits): each question paper shall have 6 questions:

	Total marks	
Q. 1	14	Must be drawn from Unit 1 and will have one long question of 14 marks OR two short questions of 7 marks each
Q. 2	14	Must be drawn from Unit 2 and will have one long question of 14 marks OR two short questions of 7 marks each
Q. 3	07	10 short questions must be drawn from Unit 1 & 2, out of which student has to answer any 7.
Q. 4	14	Must be drawn from Unit 3 and will have one long question of 14 marks OR two short questions of 7 marks each
Q. 5	14	Must be drawn from Unit 4 and will have one long question of 14 marks OR two short questions of 7 marks each
Q. 6	07	10 short questions must be drawn from Unit 3 & 4 out of which student has to answer any 7.
Total	70	

4. For question paper of 35 marks (2 credits): each question paper shall have 3 questions:

	Total marks	
Q. 1	14	Must be drawn from Unit 1 and will have one long question of 14 marks OR two questions of 7 marks each.
Q. 2	14	Must be drawn from Unit 2 and will have one long question of 14 marks OR two questions of 7 marks each.
Q. 3	7	8 short questions must be drawn from Unit 1 & 2, out of which student has to answer any 7.
Total	35	

Semester II

Course	Course code	Paper title	Exam duration (Hours)	External marks	Internal marks	Total marks	Teaching hours per week	Credit points
Paper-I	IPLFSc-201CC	Techniques and Tools for Biology	2.30	70	30	100	4	4
Paper-II	IPLFSc-202CC	Biodiversity and Conservation Biology	2.30	70	30	100	4	4
Paper-III	IPLFSc-203CC	Genetics	2.30	70	30	100	4	4
Practical Paper-I	IPLFSc-201PC	Techniques and Tools for Biology practical	More than 4 hours	50	00	50	4	2
Practical Paper-II	IPLFSc-202PC	Biodiversity and Conservation Biology practical	More than 4 hours	50	00	50	4	2
Practical Paper-II	IPLFSc-203PC	Genetics practical	More than 4 hours	50	00	50	4	2
Ability Enhancement course	IPLFSc-201AEC	Environmental Studies	2.00	35	15	50	2	2
Generic elective	IPLFSc-201GE	Genetic Engineering and Biotechnology	2.00	35	15	50	2	2
Elective subject course	IPLFSc-201ES	Public Health and Management	2.00	35	15	50	2	2
	IPLFSc-202ES	OR Biofertilizers						
Total				465	135	600	30	24

IPLFSC-201CC TECHNIQUES AND TOOLS FOR BIOLOGY

UNIT – I

- Safety practice in laboratory. Concept about Solute, solvent and solution. Concept of normality, molarity and molality.
- Storage of reagent and solution. Concept of Good laboratory Practice.
- Quantitative transfer of liquids
- General cleaning and maintenance of laboratory instruments

UNIT – II

- Principle and application of pH Meter
- Photometry: Colorimeter and spectrometer
- Principle and application of centrifuge
- Principle and application of weighing balance

UNIT – III

- Magnification and resolving power
- Principle and application of Simple, Light and compound microscope
- Principle and application of Electron (SEM and TEM) microscope
- Working principle of Fluorescence microscope

UNIT – IV

- Chromatography: Historical prospective
- Principle and classification of chromatography
- Principle and application of paper and thin layer chromatography

Reference books

1. Wilson, K. and Walker, J., (2010). Principles and Techniques of Biochemistry and Molecular Biology, 7th edition, Cambridge University Press (Low price edition), New York.
2. Webster J. G., (2009). Bioinstrumentation, Student edition, Wiley India (P) Ltd. New Delhi.
3. Sharma, B. K., (2005). Instrumental methods of chemical analysis, 24th edition, GOEL publishing house, Meerut.

IPLFSC-202CC BIODIVERSITY AND CONSERVATION BIOLOGY

Unit I

- Introduction to Biodiversity
- Concepts and components of biodiversity.
- Types of biodiversity: Species, Genetic and Ecosystem diversity.
- Values and threats to biodiversity.

Unit II

- Floral and Faunal Biodiversity of India and Gujarat.
- Endemic and Threatened floral and faunal diversity of India and Gujarat.
- Biodiversity hotspots of India; Important floral and faunal diversity of India and its Status & Distribution
- Important Protected Areas in India and Gujarat

Unit III

- Significance of Conservation: Definition, History and Background and types of conservation
- Significance of conservation; In-situ conservation and Ex-situ conservation.
- Role of protected areas in biodiversity conservation in India.
- Major Conservation Projects

Unit IV

- Conservation significance , Conservation Laws & Policies
- International Union for Conservation of Nature (IUCN), threat categories, Red data book, and role of IUCN in biodiversity conservation
- National Biodiversity Act (2002)

Reference books

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.

IPLFSC-203CC GENETICS

Unit I

- Introduction to genetics: scope, importance, branches
- Terminology and symbols of genetics
- Introduction to Mendel's work, Phenomenon of dominance, variation in dominance
- Laws of segregation, law of independent assortment, back cross and test cross

Unit II

- Principles of Inheritance, chromosome theory of inheritance
- Genetic interaction, epistasis, pleiotropy and lethal genes
- Multiple alleles and Pedigree analysis
- Quantitative genetics

Unit III

- Theories of linkage
- Types of linkage
- Types of crossing over, mechanism of meiotic crossing over
- Theories about mechanism of crossing over, tetrad analysis, cytological detection of crossing over

Unit IV

- Chromosomal mutation: structural changes in chromosomes, types of structural changes in chromosomes
- Euploidy, Aneuploidy and Polyploidy
- Gene mutations: Induced v/s Spontaneous, Back v/s Suppressor mutations. Molecular basis of mutations in relation to UV light and chemical mutagens, Detection of mutations: CLB method, Attached X-method, DNA repair mechanisms

Reference books

1. Lodish et. 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.

IPLFSC-201PC TECHNIQUES AND TOOLS FOR BIOLOGY PRACTICAL

1. Principles, working and use of following laboratory instruments: microscope, incubator, pH meter, spectrometer and colorimeter
2. Study of different types of microscopes
3. Separation of biomolecules using thin layer chromatography
4. Separation of amino acids using paper chromatography
5. Study of different types of centrifuge
6. Study of different types of weighing balances
7. Visit and report preparation about central instrumentation facility.

IPLFSC-202PC BIODIVERSITY AND CONSERVATION BIOLOGY PRACTICAL

1. Mapping of different biogeographical realm and study of their flora and fauna
2. Mapping of biodiversity hotspots of the world and study of their flora and fauna
3. Mapping and study of flora and fauna of selected national parks and sanctuaries of India
4. Mapping of distribution of endemic and critically endangered flora and fauna of India
5. Calculation of different biodiversity indices
6. To determine density/frequency/abundance of the vegetation by quadrat method in the field or on given simulation sheet
7. To prepare the report on local floral and faunal diversity.

IPLFSC-203PC GENETICS PRACTICAL

1. Numerical problem solving of Mendel's laws of inheritance
2. Genetic problems on gene mapping using three point test cross data
3. Study of pedigree analysis
4. Construct normal human karyotype
5. Diagnosis of genetical disorders using karyotypes
6. Petite Mutant isolation
7. Replica Plate Technique to prove spontaneous nature of mutation

IPLFSC-201AEC ENVIRONMENTAL STUDIES

UNIT – I

- Multidisciplinary nature of environmental studies; Scope and importance; Concept of sustainability and sustainable development.
- Land resources and land use change; Land degradation, soil erosion and desertification. Deforestation: Causes and impacts due to mining, dam building on environment
- Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state).
- Energy resources: Renewable and non renewable energy sources, use of alternate energy sources

UNIT – II

- Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture
- Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD).
- Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context

Reference books

1. Gadgil, M., & Guha, R. 1993. This Fissured Land: An Ecological History of India. Univ. of California Press.
2. Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge.
3. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi.
4. Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. Conservation Biology: Voices from the Tropics. John Wiley & Sons.

IPLFSC-201GE GENETIC ENGINEERING AND BIOTECHNOLOGY

UNIT – I

- Milestones in genetic engineering and biotechnology
- Restriction modification systems: Mode of action, applications of Type II restriction enzymes in genetic engineering DNA modifying enzymes and their applications
- DNA polymerases. Terminal deoxynucleotidyl transferase, kinases and phosphatases, and DNA ligases,
- Agarose gel electrophoresis, Southern - and Northern - blotting techniques, SDS-PAGE and Western blotting.

UNIT – II

- Gene delivery: Microinjection, electroporation, biolistic method (gene gun), liposome and viral mediated delivery, Agrobacterium - mediated delivery
- Products of recombinant DNA technology: insulin, hGH, antisense molecules.
- Bt transgenic - cotton, brinjal, flava savo tomato
- Gene therapy, recombinant vaccine, protein engineering

Reference books

1. Clark DP and Pasternik NJ. (2009). *Biotechnology: Applying the Genetic Revolution*. Elsevier Academic Press, USA 3.
2. Primrose SB and Twyman RM. (2006). *Principles of Gene Manipulation and Genomics*, 7th edition. Blackwell Publishing, Oxford, U.K. 4.
3. Sambrook J and Russell D. (2001). *Molecular Cloning-A Laboratory Manual*. 3rd edition. Cold Spring Harbor Laboratory Press 5.
4. Wiley JM, Sherwood LM and Woolverton CJ. (2013). *Prescott, Harley and Klein's Microbiology*. 8th edition, McGraw Hill Higher Education

IPLFSC-201ES PUBLIC HEALTH AND MANAGEMENT

UNIT – I

- Types and characteristics of wastes
- Biomedical waste handling and disposal, nuclear waste handling and disposal, Waste from thermal power plants.
- Case histories on Bhopal gas tragedy, Chernobyl disaster, Seveso disaster and Three Mile Island accident and their aftermath.

UNIT – II

- Social and economic factors of disease including role of health services and other organizations.
- Infectious (Bacterial-Tuberculosis, Typhoid; Viral- AIDS, Poliomyelitis, Hepatitis; Protozoan- Leishmaniasis, Malaria)
- Lifestyle and Inherited/genetic diseases, Immunological diseases; Cancer; Diseases impacting on Western versus developing societies.

Reference books

1. Cutter, S.L. (1999). Environmental Risk and Hazards, Prentice-Hall of India Pvt. Ltd., New Delhi.
2. Kolluru R., Bartell S., Pitblado R. and Stricoff, S. (1996). Risk Assessment and Management Handbook. McGraw Hill Inc., New York.
3. Kofi, A.D. (1998). Risk Assessment in Environmental management, John Wiley and sons, Singapore.
4. Joseph, F. L. and Louver, B.D. (1997). Health and Environmental Risk Analysis fundamentals with applications, Prentice Hall, New Jersey.

IPLFSC-202ES BIOFERTILIZERS

UNIT – I

- General account of the microbes used as biofertilizers for various crop plants and their advantages over chemical fertilizers.
- Symbiotic N₂ fixers: Rhizobium - Isolation, characteristics, types, inoculum production and field application, legume/pulses plants
- Frankia - Isolation, characteristics, Alder, Casurina plants, non-leguminous crop symbiosis.
- Cyanobacteria, Azolla - Isolation, characterization, mass multiplication, Role in rice cultivation, Crop response, field application.

UNIT – II

- Free living Azospirillum, Azotobacter - free isolation, characteristics, mass inoculums, production and field application.
- Phosphate solubilizing microbes - Isolation, characterization, mass inoculum production, field application
- Importance of mycorrhizal inoculum, types of mycorrhizae and associated plants, Mass inoculum production of VAM, field applications of Ectomycorrhizae and VAM.

Reference books

1. Kannaiyan, S. (2003). Bioethnology of Biofertilizers, CHIPS, Texas.
2. Mahendra K. Rai (2005). Hand book of Microbial biofertilizers, The Haworth Press, Inc. New York.
3. Reddy, S.M. et. al. (2002). Bioinoculants for sustainable agriculture and forestry, Scientific Publishers.
4. Subba Rao N.S (1995) Soil microorganisms and plant growth Oxford and IBH publishing co. Pvt. Ltd. New Delhi.