SEMESTER V			
Core VII	**Biotechnology (Common Core)**		
Code: 18UBCC51	**Hrs/Week:4**	**Hrs/Sem: 60**	**Credits: 3**

Vision:

- To gain knowledge and develop skill in the field of about the importance of biotechnology in different fields
- To create graduates who endeavor for the welfare of mankind.
- Create opportunities for multi-disciplinary education, training and research in biotechnology

Mission:

- Impart quality education for lifelong professional growth and opportunity in a wide range of Careers.
- To create awareness towards socio-ethical implications of potentials of biotechnology
- To provide a platform for biotechnology education, training and research at the interface of multiple disciplines

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	describe different cloning vehicles and learn the different type of vectors	1	Kn, Un
CO-2	gain knowledge about techniques of biotechnology.	2	Un
CO-3	summarise the different techniques in animal biotechnology	2	Un, An
CO-4	compare the various techniques in plant and animal biotechnology	4	Cr
CO-5	enumerate cell culture, organ culture and stem cell culture and point out implications in health care	6	Kn, An
CO-6	distinguishes methods of alleviating environmental pollution and understand the synthesis of industrial products	5	An
CO-7	relate biotechnology and its benefits to mankind	6	Ap, Ev
CO-8	design, conduct experiments, analyze and interpret data for investigating problems in biotechnology and allied fields	7,8	Ap

SEMESTER V			
Core VII	**Biotechnology (Common Core)**		
Code: 18UBCC51	**Hrs/Week:4**	**Hrs/Sem: 60**	**Credits: 3**

Unit I Cloning Vectors

Introduction – Scope and importance of biotechnology – Gene cloning techniques - cloning vehicles – bacterial plasmid vectors – pBR322 and Ti plasmid – bacteriophage vectors – lambda – M13 – Plant viral vector – CaMV- Gemini virus and tobamovirus – animal viral vector – SV40- Role of restriction and modification enzymes

Unit II Gene Cloning and Screening

Gene cloning – methods of introduction of cloned genes into host cells – transformation – liposome mediated transfer – electroporation – particle bombardment gun – viral vector method – DNA library – PCR – hybridization technique – blotting techniques – Southern, Northern and Western.

Unit –III Cell, Tissue and Organ culture

Culture media – cell culture techniques – monolayer culture and immobilized culture of cell lines –callus culture – suspension culture and anther culture – techniques and applications of human embryonic stem cell culture – plant embryo culture- invitro pollination – organ culture – techniques – tissue engineering of artificial skin and cartilage.

Unit – IV Environmental and Bioprocess technology

Biotechnological methods for sewage and waste water treatment – bioremediation – degradation of xenobiotic (hydrocarbons and pesticides) – role of genetically engineered microbes – biomining – bioleaching – industrial production of penicillin and ethanol – Biodiesel – Biofertilizer – mass cultivation and application of Azola

Unit –V Health care biotechnology

DNA probes and diagnosis of genetic disorders – DNA fingerprinting technique – gene therapy and treatment of genetic diseases – vaccines – recombinant DNA vaccines and viral vaccines – edible vaccines- Bt cotton – Golden rice- Human Genome Project – types – methods of sequencing – potential benefits of mankind

Text Books

Dubey R.C, S *A text book of Biotechnology* .Chand and Comp.Ltd, New Delhi, 2004.
Kumaresan, V., Biotechnology . - Saras Publication , Nagercoil - 2010

Books for Reference

1. Clark and J. Pazdernik. 2009. *Biotechnology*, Elsevier Academic Press, California, USA.
2. Dubey, R.C. 2006. *Text Book of Biotechnlogy*, 4th edition, S. Chand and Co Ltd, New Delhi.
3. Ramadass, P. 2009. *Animal Biotechnology – Recent Concepts and Development*. MJP Publishers, Chennai
4. Rema, L.P. 2009. *Applied Biotechnology*, MJP Publishers, Chennai.

5. Shailendra Singh, 2007. *Applied Biotechnology*, 1st edition, Campus Books International New Delhi.
6. Singh, B.D. 2005. *Biotechnology, Revised edition*, Kalyani Publishers, Chennai.

Practicals 18UBCCR5

Hours/Week :2 **Credits : 1**

1.Isolation of Blue Green Algae
2. Preparation of synthetic seed
3. Estimation of dissolved oxygen and BOD
4. DNA Estimation by Spectrophotometric method
5. Preparation of plant and animal tissue culture media
6. Preparation of SDS – PAGE (Gel mould only)
7. Isolation of protoplast
8. Estimation of protein by column chromatography
9. Demonstration :
   Electrophoresis – full technique
   Blotting technique
   PCR – DNA Amplification
   Mushroom cultivation / Vermiculture
10. Models and Charts pertaining to theory

Book for Reference:

1. Aneja,K.R., *Experiments in Microbiology, Plant Pathology and Tissue Culture*, Wishwa Prakashan, (A Division of Wiley Eastern Ltd), New Delhi.

SEMESTER V			
Core VIII	**Microbiology**		
Code: 18UBOC52	**Hrs/week: 5**	**Hrs/semester: 75**	**Credits: 4**

Vision:

- To provide information on various techniques to culture different microbial strains and recent advances in the field of microbiology

Mission:

- To know the characteristic features of microbes including their mode of nutrition
- To make the students aware of symptoms and preventive measures of common human diseases.
- To exploit the potentialities of microorganisms in food and industries.

Course Outcome

CO.No.	Upon completion of this programme, students will be able to	PSO addressed	CL
CO-1	realise the history and scope of microbiology	3	Un
CO-2	understand the structure and growth characteristics of microorganism that enabling the learner to identify and classify microorganisms by themselves	4	Cr
CO-3	use various microbiological techniques to isolate, characterize and identify bacterial and viral pathogens of plants.	6	An
CO-4	provide a thorough knowledge about the microbes causing human diseases , their symptoms and preventive measures	4	Ap
CO-5	understand the role of microorganisms in biotechnology, fermentation, medicine and other industries for human well being	4	Ap
CO-6	discuss the role of microorganism in food, milk and water	4	An
CO-7	identify and control food borne disease and food spoilage	4	An
CO-8	test the quality of milk and enumerate microorganisms found in milk and soil	6	Ev

SEMESTER V			
Core VIII	**Microbiology**		
Code: 18UBOC52	**Hrs/week: 5**	**Hrs/semester: 75**	**Credits: 4**

Unit I:

Brief history and scope of microbiology. Morphology and ultra structure of Bacteria. Reproduction – binary fission, conjugation, transduction and transformation. Nutrition types - chemosynthetic, photosynthetic, saprophytic, parasitic and symbiotic.

Unit II

Culture of microorganisms – sterilization (dry, heat, moist heat and filtration), media for micro organisms (NA, Czapek-Dox and PDA), Methods of culturing bacteria – broth culture, agar plate and agar slant culture, pure culture, batch culture and continuous culture. Growth – phases of growth.

Unit III

Virus – general characteristics, structure and multiplication of TMV and T_4 phage. Microbes and human diseases –typhoid, cholera, tuberculosis and influenza

Unit IV

Fermentation technology- fermentors- stirred tank, tower and air lift. Commercial production of vinegar, citric acid, penicillin and vitamin B_{12}.

Unit V

Food microbiology – types of food spoilage and methods of food preservation. Microorganisms as food -single cell protein –bacteria, fungi and yeast.
Milk microbiology - bacterial flora in milk, types of contamination and pasteurization of milk.
Water microbiology – testing potability of water and methods of purification of potable water.

Text Book

1. Dubey, R.C. and D.K. Maheswari, 2003. A textbook of Microbiology. S. Chand company Ltd. New Delhi.

Books for Reference:

1. Adams, M.R. and M.O. Moss, 2005. Food Microbiology. New Age International publishers.
2. Kalaichelvan, P.T. 2005. Microbiology. Biotechnology - Lab Manual – MJP Publishers, Chennai.
3. Patel, A.H. 2004. Industrial Microbiology. Mac Milan India Ltd., New Delhi.
4. Pelzar, M.H., E.C.S Chan and N.R. Krieg. 2005. Microbiology. Tata MC. Graw Hill Pub. Co. Ltd., New Delhi.
5. Purohit, S.S. 1988. Microbiology. Agro Botanical publishers India.

Practical

Hrs/ week: 2

- Sterilization (dry, heat, moist heat and filtration)
- Preparation of media- NA, PDA
- Demonstration of plating and serial dilution technique
- Pure culture technique – streak plate method
- Staining of Bacteria (Gram's staining)
- Analysis of milk – dye reduction test

Spotters

- Ultra structure of bacterial cell, T_4 phage, TMV and HIV-EM
- Colony counter
- Fermentors- stirred tank, tower and air lift,
- Agar slant/ stab/plate
- Milk samples
- Spoiled food

Submission: Record note book

Book for Reference: Lakshmanan M, Kunthala Jeyaraman, Jeyaraman and Gnanam, 1971. Laboratory experiments in microbiology and molecular biology, Higginbothams Pvt. Ltd.

SEMESTER VI			
Core XI	**Marine Botany**		
Code:18UBOC62	**Hrs/week: 5**	**Hrs/semester: 75**	**Credits: 4**

Vision:

- To give elaborate account on marine environment and its role in controlling the Earth's climate.

Mission:

- To understand the different types of marine habitats and the adaptation of life there in.
- To understand the role of marine products and their socio economic and environmental significance

Course Outcome

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	analyze how marine organism adapt to their dynamic environment	5	Un
CO-2	understand the marine environment and classify them	7	Un
CO-3	able to signify the characteristic feature of sandy shore and sand dunes and their economic importance	1	An
CO-4	achieve practical skills in processing, preserving and culturing marine plants	6	Ev
CO-5	evaluate the uses of marine resources and realize the role of marine plants in the economy of the ocean	5	Ap
CO-6	able to signify the characteristic feature of coral reefs and their role in biodiversity conservation	1	An
CO-7	able to identify and understand the role of mangroves in coastal protection and their adaptation to its hostile environment	5	Ap
CO-8	explain the ecological relationship between organisms and their environment	2	An

SEMESTER VI			
Core XI	**Marine Botany**		
Code: 18UBOC62	**Hrs/week: 5**	**Hrs/semester: 75**	**Credits: 4**

Unit I : Marine environment- classification, physical and chemical properties of sea water, characteristics and adaptations of pelagic (planktonic), benthic (littoral and deep sea) organisms.

Unit II : Introduction to marine plants - Phytoplankton – sea weeds and sea grasses - introduction, adaptation, biology, ecology, economic and medicinal significances.

Unit III : Coastal vegetation – sandy shore and sand dunes - introduction, adaptation, biology, ecology, economic and medicinal significances.

Unit IV : Coastal shore vegetation – salt marshes and mangroves - introduction, adaptation, biology, ecology, economic and medicinal significances.

Unit V : Laboratory culture of marine algae, commercial cultivation of seaweeds – general methods – *Gracilaria* and *Porphyra*. Economic importance of marine algae – in food and agriculture. Phycocolloids – agar agar, algin, alginate, carrageenan – commercial production, properties and uses, diatomite, antibiotics and vitamins. Conservation of coastal ecosystem with special reference to coral reef and mangroves.

Text Books:

1. Bilgrami, K.S. and L.C. Saha, 2004. *Textbook of Algae.* CBS publishers & Distributors, New Delhi.
2. Tait, 1978. *Elements of marine ecology*. Butterworth & Co. (Publishers) Ltd. London.

Books for Reference:

1. Boaden P.J.S. and R. Seed 1985. *An Introduction to coastal ecology.* Thomas Press Limited, New Delhi.
2. Chapman, V.J. and Chapman, 1980. *Seaweeds and their uses* – Chapman and Hall, London.
3. Dawes, C.J. 1981. *Marine Botany*. John Wiley & Sons, New york.
4. Lobban, C.S. and M. J. Wynne. 1981. *The biology of Seaweeds*. Blackwell Scientific publications. Oxford, London.
5. Newell and Newell.1977. *Marine Plankton a practical guide.* Hutchinson and Co. Ltd.
6. Sinha, P. C. 1998. *Marine pollution*, Anmol publications Pvt. Ltd. New Delhi.
7. Sverdrup H.U. 1972. *The Oceans* – Modern Asia Edition.
8. Venkataraman, G.S. 1969. *The cultivation of algae*, IARI.

Practical

Hrs/week: 2

- Phytoplanktons - Collection and identification
- Culture of micro algae
- Seaweeds- *Ulva, Sargassum, Hypnea* and *Gracilaria*
- Study of sand dune, salt marsh and mangrove vegetation in their natural habitat,
- Submission of photographs and field report for internal evaluation.

Books for Reference:

Murugesan A.G. and Rajakumari 2005. *Environmental Science and Biotechnology and Biotechnology, Theory and Techniques,* MJP Publishers.

Semester VI			
Core XII	**Ecology and Phytogeography**		
Code;18UBOC63	**hrs/week:4**	**Hrs/semester: 60**	**Credit : 4**

Vision:

- To learn about the interconnectedness of life with the environment

Mission:

- To understand the structure and function of ecosystem
- To analyze the different types of vegetation and their distribution pattern.

Course Outcome

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	reveal the range of plant diversity in terms of structure, function and their environmental relationships.	5	Un
CO-2	describe the climatic and edaphic factors and ecological succession	5	Un
CO-3	categorize the plants based on adaptation	3	An
CO-4	address the global environment crisis and the strategies applicable for environmental problem mitigation	7	Ev
CO-5	learn the global level environmental summit organized that focused for sustainable future	7	Cr
CO-6	know the importance of remote sensing in finding the current status of global health	7	Cr
CO-7	recognize the causes of environmental problems	7	Un
CO-8	discuss ecological issues and concept	5	Re

Semester VI			
Core XII	**Ecology and Phytogeography**		
Code:18UBOC63	**hrs/week:4**	**Hrs/semester: 60**	**Credit : 4**

Unit I : Introduction. Ecological factors: Climatic factor – light, temperature, wind, precipitation and humidity. Biotic factors – Interaction between plants and animals, interaction between plants growing in a community and interaction between plants and microorganisms. Edaphic factors – soil temperature, soil nutrients and soil organisms.

Unit II : Plant adaptations – morphological, anatomical and physiological adaptations of hydrophytes, xerophytes and halophytes.

Unit III : Plat communities – Characteristic features, methods of analysis- quadrats and transect methods, units of vegetation.

Unit IV : Plant succession - types, causes, processes. Hydrosere and xerosers. Climax and its concepts.

Unit V : Geographical regions of India. Vegetational types of Tamil Nadu. Structure and distribution of evergrren and deciduous forests, mangroves, scrub jungle and grassland, Endemism.

Text Books:

1. Sharma, P.D1999.*Elements of ecology*. Rastogi Publications, Shivaji Road, Meerut.
2. Shukla, R.S. and Chandal, S.S 1991. *Plant Ecology*. S, Chandal and Co. New Delhi

Books for Reference:

1. Asthana and Meera Asthana, 2001. *Environmental problems and solutions*. S.Chand and Co. Ltd., New Delhi.
2. Balasubramanian,D; C.F.a. Bryee, K.Dharmalingam, J.Green and K. Jeyaraman, 2005. *Concepts in Biotechnology*. Universities Press.
3. Dash, M.C.2001.*Fundamentals of ecology*. Tata McGraw Hill publishing Co. Ltd., New Delhi.
4. Murugesan, A.G.and Rajakumari , 2005. *Environmental Science and Biotechnology, theory and Techniques.* M.J.P. Publishers, chennai.
5. Trivedi P.R, P.L Sharma and KN Sundarshan 1994. *Natural environment and Constitution of India,* Efficient offset printers, New Delhi.
6. Tyller Miller G., 2004. *Environment Science* Thompson Brooks/Cole. Singapore.
7. Varshney C.K 1989. *Water pollution and management*, S.P. Printers, Noida.

Practical
Hrs /week: 2

- Determination of soil pH (at least 3 types of soil)
- Determination of soil texture.
- Determination of soil moisture.
- Determination of soil bulk density.
- Determination of soil porosity.
- Determination of soil organic matter content.
- Estimation of dissolved O_2 in water samples.
- Estimation of BOD in water samples.
- Estimation of COD in water samples.
- Adaptation of plants- hydrophytes, xerophytes and halophytes,

Submission - Record Note Book

Books for Reference : Murugesan A.G. and Rajakumari 2005.Environmental Science and Biotechnology and Biotechnology, Theory and Techniques, MJP Publishers

SEMESTER - V			
Core Integral I	**Biostatistics and Biological Techniques**		
Code: 18UBOI51	**Hrs / Week: 4**	**Hrs / Semester: 60**	**Credits: 4**

Vision:

- To understand the basic statistical principles and techniques used in biology.

Mission:

- To introduce the common statistical techniques and terminology.
- To familiarize the students with different instruments to carry out basic research.

Course Outcome

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the fundamentals of statistical analysis	4	Un
CO-2	apply the learned procedure for collecting data, presenting data and analyze the same.	6	An
CO-3	able to interpret the results and find solution to the problems.	8	Ev
CO-4	understand the principles, working methodology and applications of instruments used in biology	4	Cr
CO-5	apply micro techniques for permanent mounting of biological samples.	8	Cr
CO-6	apply the learned techniques to carry out basic research in biology.	4	Ap
CO-7	understand the importance of data collection and their organization	8	Un
CO-8	communicate the results of statistical analyses accurately and effectively	8	Ev

SEMESTER - V			
Core Integral I	**Biostatistics and Biological Techniques**		
Code:18UBOI51	**Hrs / Week: 4**	**Hrs / Semester: 60**	**Credits: 4**

Unit I: Introduction and scope of biostatistics. types of data – primary and secondary, Collection of data, sampling - random sampling methods and sampling error. Classification of data, preparation of frequency distribution table (discrete and continuous series).

Unit II: Presentation of data: Tabular (parts of table, types); diagrammatic – bar, pie diagram and pictogram; graphic – line graph, histogram, cumulative frequency curve.

Unit III: Measures of central tendency: simple arithmetic mean, median and mode (direct method). Measures of dispersion: standard deviation (direct method), standard error. Chi-square test (goodness-of-fit, independence of attributes). Student t-test (comparison of means of two small samples).

Unit IV: Principle and working mechanism of simple, compound and electron microscope (TEM). Microtomy – fixation, dehydration, infiltration, embedding, sectioning and staining (safranin, fast green, haematoxylin only) mounting.

Unit V: Principle, working mechanism and applications of - pH meter, spectrophotometry – colorimeter and UV spectrophotometer. Separation techniques – clinical centrifuge, electrophorosis and adsorption chromatography.

Text Books:

1. Gurumani N. 2005. *An Introduction to Biostatistics. II Edition*. M.J.P. Publishers, Chennai.
2. Gurumani N. 2006. *Research Methodology for Biological Sciences*. M.J.P. Publishers, Chennai.

Books for Reference:

1. Bryan C. Williams Keith Wilson, 1983. *A biologists guide to practical techniques of practical biochemistry second edition.* Edward Arnold publications.
2. Jayaraman J., 1985. *Laboratory manual in biochemistry,* Wiley Eastern Ltd., New Delhi.
3. Johansen,M., 1940. *Plant Microtechnique* Mc. Graw Hill.
4. Kothari C.R., 2004. *Research Methodology – Methods and techniques* New age International (P) Ltd., Publishers. New Delhi.
5. Palanisamy, S. and Manoharan, 1991. *Statistical methods for biologists*. Palani paramount publishers.

6. Plummer, D., 1987. *An introduction to practical Biochemistry*, Tata Mc. Graw Hill.
7. Pranab Kumar Banerjee, 2004. *Introduction to Biostatistics*. S. Chand & Company Ltd., New Delhi.
8. Satguru Prasad, 2003. *Fundamentals of Biostatistics*. 4th edition. Emkay Publications.
9. Subramanian, 2005. *Biophysics principles and Techniques.* MJP Publishers, Chennai.
10. Veera Bala Rastogi, 2009. *Fundamentals of Biostatistics*. II Edition. Ane Books Pvt. Ltd. Chennai.
11. Veerakumari, L., 2004. *Biochemistry* M.J.P. Publishers, Chennai.
12. Wilson, K. and J. Walker, 1997. *Practical biochemistry IV edition*, Cambridge university press.

SEMESTER V			
Core Integral II	**Pharmacognosy**		
Code:18UBOI52	**Hrs/week:4**	**Hrs/semester: 60**	**Credit: 4**

Vision:

- To provide knowledge on significance of medicinal plants and their medicinal potency.

Mission

- To understand the characterization , production and standardization of crude drugs
- To deal with methods for sustainable production of crude drugs and their therapeutic value.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	define and identify the more valuable medicinal plants based on their pharmaceutically active compounds	3	Ap
CO-2	formulate medicinal product and apply the knowledge for proper storage and distribution	8	Ap
CO-3	assess and evaluate the purity of herbal medicine.	7	Ev
CO-4	elaborate the cultural practices of important medicinal plants.	6	Re
CO-5	assess the trade opportunities of medicinal plants.	6	Ap
CO-6	define, classify and explain the importance of herbal medicine.	6	Re
CO-7	identify the crude drugs by morphological, organoleptic and histological characters.	6	Un
CO-8	know and expain the important phytoconstituents of therapeutic value.	6	Un

SEMESTER V			
Core Integral II	**Pharmacognosy**		
Code:18UBOI52	**Hrs/week:4**	**Hrs/semester: 60**	**Credit: 4**

Unit I : Definition, scope and applications of herbal medicine. Classification (morphological. therapeutic, chemical. taxonomical and chemotaxonomic classifications) and identification of drugs

Unit II : Drug adulteration. Methods of drug evaluation (morphological, micoroscopic, physical, chemical and biological).

Unit III : Botanical name, family, useful part, chemical constituents, adulterants and uses of the following drug.

Glycosides – Senna, Aloe, Digitalis, Liquorice
Terpenoids – Coriander, Fennel, Lemon, Cinnamom
Alkaloids – Datura, Opium, Vinca, Pepper
Lipids - Castor, Neem, Sesame oil.

Unit IV Methods of collection, process and storage of medicinal plants; purification of raw drugs; factors causing drug contamination, methods of storage of drugs

Unit V Extraction methods and medicinal uses of *Eucalyptus*, Castor and Lemon grass oil. Conservation of medicinal plants – *in-situ* and *ex-situ* methods

Text book:

Roseline. A. 2011. *Pharmacognosy*, MJP Publishers, Chennai.

Books for Reference

1. Anonymous. 1978. *The Ayurvedic Formulary of India.* Govt. of India, New Delhi
2. Anonymous. 1989. *Formulary of Siddha Medicine.* The Indian Medical Practitioners' Co-operative Pharmacy and Stores Ltd., Chennai
3. Anonymous. 1999. *The Ayurvedic Pharmacopoeia of India. Vol. I (1 & 2).* Ministry of Health and Family Welfare, Govt. India, New Delhi.
4. Chauhan, M.G. and A.P.G. Pillai. 2005. Microscopic Profile of Powdered Drugs Used in Indian Systems of Medicine. *Institute of Ayurvedic Medicinal Plant Sciences,* Jamnagar.
5. Daljithsimha, K. 1974. *Unani Dravyaguna Darshana*. Ayurvedic and Tibbi Academy, Lucknow
6. Kumar, N.C. 1993. *An Introduction to Medicinal Botany and Pharmacognosy*. Emkay Publications, Delhi.
7. Gokhale, S.B., Kokate, C.K. and Purohit, A.P. 2004. *A Text book of Pharmacognosy*. Nirali Prakashan, Pune.
8. Murugesh, N. 2002 *A Concise Text Book of Pharmacognosy*. Sathya Publishers, Madurai.

SEMESTER - VI			
Core Integral III	**Molecular Biology and Bioinformatics**		
Code:18UBOI61	**Hrs / Week: 4**	**Hrs / Semester: 60**	**Credits: 4**

Vision:

- To apply modern techniques in biological studies.

Mission:

- To upgrade the knowledge about the latest concepts of prokaryoti and eukaryotic genome and expression
- To make venture into plant genomic research.

Course Outcome

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	know chemistry of genetic material and details of its replication at molecular level	2	Un
CO-2	understand the general principles of chromosome organization at different phases of cell cycle	2	Un
CO-3	explain gene regulation mechanisms at various levels by which she can learn how it controls growth and development of an organism	4	Cr
CO-4	know complexity of gene expression in eukaryotes over prokaryotes	3	Un
CO-5	understand vector mediated gene transfer techniques including screening and identification of recombinants	6	Un
CO-6	know the gene cloning tools and their mysteries in success of gene cloning technology	8	Un
CO-7	attain hands on experiences in the techniques associated there of	4	Cr
CO-8	practice the advanced techniques in genetic engineering such as dna sequencing, blotting, dna amplification and fingerprinting	3	Ap

SEMESTER - VI			
Core Integral III	**Molecular Biology and Bioinformatics**		
Code18UBOI61	**Hrs / Week: 4**	**Hrs / Semester: 60**	**Credits: 4**

Unit I: DNA as genetic material, structure and replication of DNA- semi conservative method. Molecular mechanism of Replication of DNA Gene mutations- molecular basis. Mutagens and their mode of action.

Unit II: Structure of gene- intron, exon, muton, recon and cistron. Transcription in prokaryotes- molecular mechanism - initiation, elongation and termination. Role of RNA polymerase and role of initiation and transcription factors. Types of RNA and their functions (brief). Translation - initiation, elongation and termination.

Unit III: Genetic code. Properties Gene regulation in prokaryotes. Operon concept – regulation of lac operon. Methods of gene transfer in bacteria - conjugation, transformation and transduction

Unit IV: Bioinformatics – definition, scope. Biological databases - Nucleotide databases – NCBI, EMBL, Genbank, DDBJ. Protein databases – PDB, SWISS PROT.

Unit V: DNA sequence analysis – variants of biosequences -global alignment, local alignment, gap penalty alignment, affine gap penalty alignment. Bioinformatics tools – BLAST, FASTA.

Text Book:

1. Verma Agarwal. *Genetics, Molecular Biology, Ecology and Evolution*. Chand Publications, Multi colour edition

Books for Reference:

1. Benjamin Lewin, 2004. *Genes* VII. Pearson Prentice Hall.
2. Channarayappa, 2006, *Molecular Biology*. *Principles and Principles and practices.* Universities Press (India), Pvt. Ltd. 3.5.819. Hyderabad, 500 029.
3. Jin Xiong, 2006. *Essential Bioinformatics* Cambridge University Press.
4. Nicholl DST, 2001. *An Introduction of genetic engineering*. Cambridge University press.

5. Old R.N. and Primrose, S.B. 2004. *Principle of gene manipulation*. Blackwell scientific publication, USA.
6. Power C. B. 2007. *Genetics Vols. I and II*. Himalaya publishing House. Kundanal chandak. Industrial Estate. Ghat Road. Nagpur- 440 018.
7. Rastogi, S.C., Namitta Mendriata & Parag Rastogi, 2005. *Bioinformatics concepts, Skills and applications*.
8. Robert H. Tamarin. 2006 *Principles of Genetics*. Tata Mc. Graw - Hill publishing company Ltd., New Delhi
9. Sathyanarayana, U.2006. *Biotechnology*. Book and Allied (P). LTD. Kolkatha.