Vidya Pratishthan's Kamalnayan Bajaj Institute of Engineering and Technology, Baramati

Department of Information Technology

S.Y. B. Tech Syllabus 2024-25 (As per NEP 2020)

Syllabus: Open Elective Information Technology (Pattern 2023) w. e. f. AY:2024-2025															
Course Code	**Courses Name**	**Teaching Scheme**			**Examination Scheme and Marks**							**Credits**			
		TH	**PR**	**TUT**	**Activity**	**ISE**	**ESE**	**TW**	**PR**	**OR**	**Total**	**TH**	**PR**	**TUT**	**Total**
OE23009	Cyber Laws	2					50				50	2			2
OE23010	Bioinformatics	2					50				50	2			2
OE23011	Biotechnology	2					50				50	2			2

Dr. T.V.Bhandare
HoD – IT

Dr. S.M. Bhosle
Dean Academics

Dr. R.S. Bichkar
Principal

Bucket of Open Electives

Open Elective Subjects	
Subject Code	**Subject Name**
OE23001	Digital Marketing
OE23002	Professional Leadership
OE23003	Organizational Behaviour
OE23004	Industrial Management
OE23005	Disaster Management
OE23006	Energy Economics & Management
OE23007	Operations Research
OE23008	Intellectual Property Rights
OE23009	Cyber Laws
OE23010	Bioinformatics
OE23011	Biotechnology
OE23012	International Relations
OE23013	Universal Human Values
OE23014	Education Technology
OE23015	Design Thinking
OE23016	Accounting & Finance
OE23017	Sustainability & Climate Change
OE23018	Agriculture Technology
OE23019	Architectural Technology

OE23009: Cyber Laws

Course Code : OE23009	Course Credits: 02	Course type: OE

Teaching Scheme			Evaluation Scheme					
TH	**PR**	**TUT**	**ACTIVITY**	**ISE**	**ESE**	**TW**	**PR**	**OR**
2					**50**			

Prerequisite Course Mapping:

1. Basic Knowledge of Internet

Future Course Mapping: Cryptography and Network Security

Importance of Course: Students will able to learn terms in cyber security

Course Objectives:

Throughout the course, students will be expected to demonstrate their understanding of Cyber Laws & Ethics by being able to do each of the following:

1. Understand Cyber Space, Cyber Crime, Cyber Laws, Information Technology, Internet, Internet Services
2. Know Legal Aspects of Regulation concerned with Cyber Space, Technology and Forms of Cyber Crimes
3. Understand Computer Crimes and Cyber Crimes, Cyber Crime in Global and Indian Response.
4. Understand Criminal Liability, Cyber Crime implications and challenges.
5. Learn Precaution & Prevention of Cyber Crimes, Human Rights perspective of Cyber Crime

Course Outcomes:

On completion of this course, the students should be able to:

1. Understand Cyber Space, Cyber Crime, Information Technology, Internet & Services.
2. List and discuss various forms of Cyber Crimes
3. Explain Computer and Cyber Crimes
4. Understand Cyber Crime at Global and Indian Perspective.
5. Describe the ways of precaution and prevention of Cyber Crime as well as Human Rights.

Syllabus

Unit No.	Syllabus	Teaching Hours
I	**Information Technology & Cyber Crimes:**	6

	Introduction, Glimpses, Definition and Scope, Nature and Extent, Know no Boundaries, Rapid Transmission and Accuracy, Diversity and Span of Victimization, Cyber World, Inadequacy of Law, **Influence of Teenagers Information Technology:** Definition & Perspective, Growth & Future, Various Facets & Dimensions. **Regulatory Perspective on Technology:** Impact of Information and Technology, Regulation of Cyber Space, Legal Aspects of Regulation.	
II	**Technology & Forms of Cyber Crimes:** Influence of Technology on Criminality, Forms of Cyber Crimes. **Computer Crimes & Cyber Crimes:** A Criminological Analysis Computer Crimes and Cyber Crimes: Terminological Aspects, Opportunities to Cyber Criminals, Motives of Offenders, **Problems Affecting Prosecution, Cyber Crimes:** Challenges of Prevention and Control, Need and Prospects(~f Criminological Research	6
III	**Cyber Crimes 'and Global Response:** Global Perspective, Country wise Legal Response, Country wise Analysis. **Cyber Crimes and Indian Response:** Introduction, The Indian Information Technology Act 2000, Preamble & Coverage, Nature of Offences and Penalties, Miscellaneous and Subsidiary Provisions Certain Shortcomings, Future Prospects and Needs	6
IV	**Mens Rea & Criminal Liability:** Introduction, Historical Perspectives, Mens Rea in Indian Criminal Law, Mens Rea in English Criminal Law, Abetment of Offence, Criminal Liability and Role of Mens Rea in Indian Information Technology Act, 2000 **Investigation in Cyber Crimes: Implications and Challenges: :** Introduction, Procedural Aspects, Issues, Complications and Challenges Concerning Cyber Crimes, Problems and Precautionary measures for Investigation.	6

Text Books-

1. Dr Pramod Kr.Singh, "LawsonCyber Crimes[Along with IT Act and RelevantRules]" Book Enclave Jaipur India

Reference Books-

1. Craig B, "Cyber Law: The Law of the Internet and Information Technology". PearsonEducation.
2. Pawan Duggal, "Cyber Laws" Universal Law Publishing.

3. K.Kumar," Cyber Laws:Intellectual property&E Commerce, Security", First Edition, Dominant Publisher, 2011.
4. Rodney D. Ryder, "Guide to Cyber Laws", Second Edition, Wadhwa And Company, New Delhi, 2007.
5. Vakul Sharma, "Handbook of Cyber Laws" Macmillan India Ltd, Second Edition, PHI, 2003.
6. JusticeYatindraSingh, "Cyber Laws", Universal LawPublishing, First Edition,NewDelhi, 2003.
7. Sharma, S.R., "Dimensions of Cyber Crime", Annual Publications Pvt. Ltd., First Edition, 2004. Augastine, Paul T., "Cyber Crimes and Legal Issues", Crecent Publishing Corporation, 2007

OE23010: Bioinformatics

Course Code : OE23010	Course Credits: 02	Course type: OE

Teaching Scheme			Evaluation Scheme					
TH	**PR**	**TUT**	**ACTIVITY**	**ISE**	**ESE**	**TW**	**PR**	**OR**
2					**50**			

Prerequisite Course Mapping:

1. Life Science.

Future Course Mapping:

1. Bioinformatics and data science
2. Biomedical Engineering

Importance of Course:

Bioinformatics integrates biology, computer science, and engineering principles. It allows engineering students to apply their skills in data analysis, algorithms, and computational methods to biological systems. This interdisciplinary approach fosters innovation and problem-solving across different fields.

Course Objectives:

1. To familiarize students with various types of biological data including sequences (DNA, RNA, protein), structures, pathways, and genetic variations. Students learn how to access, retrieve, and interpret these data from databases.
2. To introduce students to computational tools, algorithms, and software used in bioinformatics for data analysis, sequence alignment, molecular modeling, phylogenetic analysis, and prediction of protein structure and function.
3. To bridge the gap between biology and computer science/engineering, helping students understand how computational methods can be applied to biological questions and problems.

4. To promote collaboration between students from diverse backgrounds (biology, computer science, engineering) to solve complex biological problems through interdisciplinary approaches.
5. To expose students to current trends in bioinformatics research and emerging technologies.

Course Outcomes:

On completion of this course, the students should be able to:

1. To impart knowledge of life science and biological data ·
2. To acquire knowledge of computational and mathematical skills for addressing important biological questions.
3. To learn how to develop and implement computational algorithms and tools for processing biological data

Syllabus

Unit No.	Syllabus	Teaching Hours
I	Introduction to Computational biology and its applications. Central dogma and biological macromolecules- DNA, RNA & proteins. Major biological databases related to DNA, RNA, proteins & metabolic pathways	6
II	Basic file formats & sequence representation. Computational algorithms for Sequence Alignment: Local and global alignment, Sequence similarity, Sequence identity, Gaps, Scoring matrices, pairwise and multiple alignments, Dynamic programming, BLAST & its application,	6
III	Algorithms for phylogenetic: Phylogenetic Trees Based on Pairwise Distances, Phylogenetic Trees Based on Neighbor Joining, Phylogenetic Trees Based on Maximum Parsimony, Phylogenetic Trees Based on Maximum Likelihood Estimation, Software for Phylogenetic Analysis	6
IV	Structural Bioinformatics: Protein Structure and its visualization, Protein structural alignment, Protein secondary Structure Prediction, Protein tertiary	6

	Structure Prediction, RNA Structure Prediction, Molecular docking and docking algorithms. Application of machine learning in biological sciences	

Text Books:

1. Bioinformatics: Sequence and Genome Analysis by David W Mount, Cold Spring Harbor Laboratory Press
2. Introduction to Bioinformatics by Arthur MLesk

Reference Books:

1. Protein bioinformatics: an algorithmic approach to sequence and structure analysis by Ingvar Eidhammer, IngeJonassen and William R.Taylor.
2. Essentials of Bioinformatics by JinXiong

OE23011: Biotechnology

Course Code : OE23011	Course Credits: 02	Course type: OE

Teaching Scheme			Evaluation Scheme					
TH	PR	TUT	ACTIVITY	ISE	ESE	TW	PR	OR
2					50			

Prerequisite Course Mapping:
1. Basic understanding of biology (recommended) and proficiency in programming languages (e.g., Python, R) for computational tasks.

Future Course Mapping:
1. Bioinformatics and Biotechnology
2. Biomedical Engineering

Importance of Course:
These course is designed to equip students with a solid foundation in biotechnology principles and practical skills, enabling them to leverage their computational expertise in biotechnological applications and interdisciplinary collaborations. By achieving course outcomes, students will be well-prepared to contribute to advancements in biotechnology and pursue diverse career opportunities in the rapidly evolving field of biotechnology and related industries.

Course Objectives:
1. Understand fundamental concepts of molecular biology and genetics.
2. Apply computational tools and techniques to analyze biological data.
3. Explore applications of biotechnology in fields relevant to computer engineering.
4. Critically assess ethical and societal implications of biotechnological advancements.
5. Collaborate effectively in interdisciplinary teams for biotechnology projects.

Course Outcomes:

On completion of this course, the students should be able to:

1. To Explain fundamental concepts in biotechnology including molecular biology, genetics, and biotechnological techniques such as PCR, gene editing, and recombinant DNA technology
2. To apply bioinformatics tools and computational algorithms for analyzing biological data, performing sequence alignment, predicting protein structures, and modeling biological processes.
3. To explore applications of biotechnology in medicine (e.g., personalized medicine, biopharmaceutical development), agriculture (e.g., GMOs, crop improvement), and environment (e.g., bioremediation, waste treatment).
4. To analyze and discuss ethical considerations related to biotechnological advancements, genetic privacy, biosecurity, and societal impacts of biotechnology in healthcare, agriculture, and environment.

Syllabus

Unit No.	Syllabus	Teaching Hours
I	**Introduction to Biotechnology**: Overview of biotechnology: history, scope, and applications. Introduction to molecular biology: DNA, RNA, proteins, and genetic information. **Genetic Engineering**: Basics of genetic engineering techniques: PCR, cloning, gene editing (CRISPR/Cas9). Applications of genetic engineering in medicine, agriculture, and industry.	**6**
II	**Bioinformatics for Biotechnology**: Introduction to bioinformatics: databases, tools, and algorithms. Sequence analysis: sequence alignment, genome assembly, and annotation. **Computational Biology**: Introduction to computational biology techniques. Predictive modeling in biology: protein structure prediction, molecular dynamics simulations.	**6**
III	**Biotechnology in Medicine**: Biotechnological applications in medicine: drug discovery, personalized	**6**

	medicine, diagnostics. Case studies and current trends in biopharmaceuticals. **Biotechnology in Agriculture and Environment:** Agricultural biotechnology: genetically modified organisms (GMOs), crop improvement. Environmental biotechnology: bioremediation, waste treatment.	
IV	**Ethical and Societal Issues:** Ethical considerations in biotechnology: privacy, consent, and access to genetic information. Societal impacts and regulatory frameworks for biotechnological advancements.	**6**

Text Books:

1. "Molecular Biology of the Cell" by Alberts et al.
2. "Principles of Gene Manipulation and Genomics" by Primrose and Twyman.

Reference Books:

1. "Biotechnology for Beginners" by Reinhard Renneberg, Arnold L. Demain, and Dieter Antranikian
2. "Biotechnology: Applying the Genetic Revolution" by David P. Clark and Nanette J. Pazdernik

Online Resources:

1. Online resources: NCBI databases, bioinformatics tools (e.g., BLAST, UCSC Genome Browser).

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