



ADIKAVI NANNAYA UNIVERSITY: RAJMAHENDRAVARAM

B.Sc Forensic Science

Single Major

From 2023-24 (Syllabus-Curriculum)

Course Structure

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
I	I	1	Introduction to Classical Biology	3+2	4
	I	2	Introduction to Applied Biology	3+2	4



SEMESTER-I

COURSE 1: INTRODUCTION TO CLASSICAL BIOLOGY

Theory

Credits: 4

5 hrs/week

Learning objectives

The student will be able to learn the diversity and classification of living organisms and understand their chemical, cytological, evolutionary and genetic principles.

Learning Outcomes

1. Learn the principles of classification and preservation of biodiversity
2. Understand the plant anatomical, physiological and reproductive processes.
3. Knowledge on animal classification, physiology, embryonic development and their economic importance.
4. Outline the cell components, cell processes like cell division, heredity and molecular processes.
5. Comprehend the chemical principles in shaping and driving the macromolecules and life processes.

Unit 1: Introduction to systematics, taxonomy and ecology.

- 1.1. Systematics – Definition and concept, Taxonomy – Definition and hierarchy.
- 1.2. Nomenclature – ICBN and ICZN, Binomial and trinomial nomenclature.
- 1.3. Ecology – Concept of ecosystem, Biodiversity and conservation.
- 1.4. Pollution and climate change.

Unit 2: Essentials of Botany.

- 2.1. The classification of plant kingdom.
- 2.2. Plant physiological processes (Photosynthesis, Respiration, Transpiration, phytohormones).
- 2.3. Structure of flower – Micro and macro sporogenesis, pollination, fertilization and structure of mono and dicot embryos.
- 2.4 Mushroom cultivation, floriculture and landscaping.

Unit 3: Essentials of Zoology

- 3.1. The classification of Kingdom Animalia and Chordata.
- 3.2 Animal Physiology – Basics of Organ Systems & their functions, Hormones and Disorders
- 3.3 Developmental Biology – Basic process of development (Gametogenesis, Fertilization, Cleavage and Organogenesis)
- 34 Economic Zoology – Sericulture, Apiculture, Aquaculture



Unit 4: Cell biology, Genetics and Evolution

- 4.1. Cell theory, Ultrastructure of prokaryotic and eukaryotic cell, cell cycle.
- 4.2. Chromosomes and heredity – Structure of chromosomes, concept of gene.
- 4.3. Central Dogma of Molecular Biology.
- 4.4. Origin of life

Unit 5: Essentials of chemistry

- 5.1. Definition and scope of chemistry, applications of chemistry in daily life.
- 5.2. Branches of chemistry
- 5.3. Chemical bonds – ionic, covalent, noncovalent – Vander Waals, hydrophobic, hydrogen bonds.
- 5.4. Green chemistry

References

1. Sharma O.P., 1993. Plant taxonomy. 2nd Edition. McGraw Hill publishers.
2. Pandey B.P., 2001. The textbook of botany Angiosperms. 4th edition. S. Chand publishers, New Delhi, India.
3. Jordan E.L., Verma P.S., 2018. Chordate Zoology. S. Chand publishers, New Delhi, India.
4. Rastogi, S.C., 2019. Essentials of animal physiology. 4th Edition. New Age International Publishers.
5. Verma P.S., Agarwal V.K., 2006. Cell biology, genetics, Molecular Biology, Evolution and Ecology. S. Chand publishers, New Delhi, India.
6. Sathyanarayana U., Chakrapani, U., 2013. Biochemistry. 4th Edition. Elsevier publishers.
7. Jain J.L., Sunjay Jain, Nitin Jain, 2000. Fundamentals of Biochemistry. S. Chand publishers, New Delhi, India.
8. Karen Timberlake, William Timberlake, 2019. Basic chemistry. 5th Edition. Pearson publishers.
9. Subrata Sen Gupta, 2014. Organic chemistry. 1st Edition. Oxford publishers.



ACTIVITIES:

1. Make a display chart of life cycle of nonflowering plants.
2. Make a display chart of life cycle of flowering plants.
3. Study of stomata
4. Activity to prove that chlorophyll is essential for photosynthesis
5. Study of pollen grains.
6. Observation of pollen germination.
7. Ikebana.
8. Differentiate between edible and poisonous mushrooms.
9. Visit a nearby mushroom cultivation unit and know the economics of mushroom cultivation.
10. Draw the Ultrastructure of Prokaryotic and Eukaryotic Cell
11. Visit to Zoology Lab and observe different types of preservation of specimens
12. Hands-on experience of various equipment – Microscopes, Centrifuge, pH Meter, Electronic Weighing Balance, Laminar Air Flow
13. Visit to Zoo / Sericulture / Apiculture / Aquaculture unit
14. List out different hormonal, genetic and physiological disorders from the society



SEMESTER-I

COURSE 2: INTRODUCTION TO APPLIED BIOLOGY

Theory

Credits: 4

5 hrs/week

Learning objectives

The student will be able to learn the foundations and principles of microbiology, immunology, biochemistry, biotechnology, analytical tools, quantitative methods, and bioinformatics.

Learning Outcomes

1. Learn the history, ultrastructure, diversity and importance of microorganisms.
2. Understand the structure and functions of macromolecules.
3. Knowledge on biotechnology principles and its applications in food and medicine.
4. Outline the techniques, tools and their uses in diagnosis and therapy.
5. Demonstrate the bioinformatics and statistical tools in comprehending the complex biological data.

Unit 1: Essentials of Microbiology and Immunology

- 1.1. History and Major Milestones of Microbiology; Contributions of Edward Jenner, Louis Pasteur, Robert Koch and Joseph Lister.
- 1.2. Groups of Microorganisms – Structure and characteristics of Bacteria, Fungi, Archaea and Virus.
- 1.3. Applications of microorganisms in – Food, Agriculture, Environment, and Industry.
- 1.4. Immune system – Immunity, types of immunity, cells and organs of immune system.

Unit 2: Essentials of Biochemistry

- 2.1. Biomolecules I – Carbohydrates, Lipids.
- 2.2. Biomolecules II – Amino acids & Proteins.
- 2.3. Biomolecules III – Nucleic acids -DNA and RNA.
- 2.4. Basics of Metabolism – Anabolism and catabolism.

Unit 3: Essentials of Biotechnology

- 3.1. History, scope, and significance of biotechnology. Applications of biotechnology in Plant, Animal, Industrial and Pharmaceutical sciences.
- 3.2. Environmental Biotechnology – Bioremediation and Biofuels, Bio fertilizers and Bio pesticides.
- 3.3. Genetic engineering – Gene manipulation using restriction enzymes and cloning vectors; Physical, chemical, and biological methods of gene transfer.
- 3.4. Transgenic plants – Stress tolerant plants (biotic stress – BT cotton, abiotic stress – salt tolerance). Transgenic animals – Animal and disease models.



Unit 4: Analytical Tools and techniques in biology – Applications

- 4.1. Applications in forensics – PCR and DNA fingerprinting
- 4.2. Immunological techniques – Immunoblotting and ELISA.
- 4.3. Monoclonal antibodies – Applications in diagnosis and therapy.
- 4.4. Eugenics and Gene therapy

Unit 5: Biostatistics and Bioinformatics

- 5.1. Data collection and sampling. Measures of central tendency – Mean, Median, Mode.
- 5.2. Measures of dispersion – range, standard deviation and variance. Probability and tests of significance.
- 5.3. Introduction, Genomics, Proteomics, types of Biological data, biological databases- NCBI, EBI, Gen Bank; Protein 3D structures, Sequence alignment
- 5.4. Accessing Nucleic Acid and Protein databases, NCBI Genome Workbench

REFERENCES

1. Gerard J., Tortora, Berdell R. Funke, Christine L. Case., 2016. Microbiology: An Introduction. 11th Edition. Pearson publications, London, England.
2. Micale, J. Pelczar Jr., E.C.S. Chan., Noel R. Kraig., 2002. Pelczar Microbiology. 5th Edition. McGraw Education, New York, USA.
3. Sathyanarayana U., Chakrapani, U., 2013. Biochemistry. 4th Edition. Elsevier publishers.
4. Jain J.L., Sunjay Jain, Nitin Jain, 2000. Fundamentals of Biochemistry. S. Chand publishers, New Delhi, India.
5. R.C. Dubey, 2014. Advanced Biotechnology. S. Chand Publishers, New Delhi, India.
6. Colin Ratledge, Bjorn, Kristiansen, 2008. Basic Biotechnology. 3rd Edition. Cambridge Publishers.
7. U. Sathyanarayana, 2005. Biotechnology. 1st Edition. Books and Allied Publishers pvt. ltd., Kolkata.
8. Upadhyay, Upadhyay and Nath. 2016. Biophysical Chemistry, Principles and Techniques. Himalaya Publishing House.
9. Arthur M. Lesk. Introduction to Bioinformatics. 5th Edition. Oxford publishers.
10. AP Kulkarni, 2020. Basics of Biostatistics. 2nd Edition. CBS publishers.

ACTIVITIES

1. Identification of given organism as harmful or beneficial.
2. Observation of microorganisms from house dust under microscope.
3. Finding microorganism from pond water.

4. Visit to a microbiology industry or biotech company.
5. Visit to a waste water treatment plant.
6. Retrieving a DNA or protein sequence of a gene'
7. Performing a BLAST analysis for DNA and protein.
8. Problems on biostatistics.
9. Field trip and awareness programs on environmental pollution by different types of wastes and hazardous materials.
10. Demonstration on basic biotechnology lab equipment.
11. Preparation of 3D models of genetic engineering techniques.
12. Preparation of 3D models of transgenic plants and animals.

[**NOTE:** In the colleges where there is availability of faculty for microbiology and biotechnology, those chapters need to be handled by microbiology and biotechnology faculty. In other colleges, the above topics shall be dealt by Botany and Zoology faculty]

Course – I & II Model Paper (70 Marks)

SECTION A (Multiple Choice Questions)

30 x 1 = 30 M

30 Multiple Choice Questions (Each Unit 6 Questions)

SECTION B (Fill in the blanks)

10 x 1 = 10 M

10 Fill in the Blanks (Each Unit 2 Questions)

SECTION C (Very short answer questions)

10 x 1 = 10 M

10 Very short answer questions (Each Unit 2 Questions)

SECTION D (Matching) (From 5 Units)

2 x 5 = 10 M

1 A

B

C

D

E

2 A

B

C

D

E

SECTION E (True or False)

10 x 1 = 10 M

10 True or False (Each Unit 2 Questions)



ADIKAVI NANNAYA UNIVERSITY: RAJMAHENDRAVARAM
Single Major (w.e.f:2023-24A.B)

Programme: B.Sc. Honours in Forensic Science (Major)
SEMESTER – II

COURSE STRUCTURE

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
	II	3	Forensic Science and Criminology	3	3
			Forensic Science and Criminology Practical Course	2	1
		4	Forensic Document Examination	3	3
			Forensic Document Examination Practical Course	2	1



ADIKAVI NANNAYA UNIVERSITY: RAJMAHENDRAVARAM
Single Major (w.e.f:2023-24A.B)

SEMESTER-II

COURSE 3: FORENSIC SCIENCE AND CRIMINOLOGY

Theory Credits: 3 3 hrs/week

Learning objectives: The student will be able to understand the basics and history of forensic science and criminology.

Learning outcomes: After studying this course the students will know-

- The significance of Forensic Sciences to the Criminal Justice System.
- The working conditions of Forensic Science Laboratory.
- The importance of criminology and penology for crime detection.
- The working of Indian courts and role of criminal justice system in crime detection.

Unit 1: Basics and Historical Development of Forensic Science

Introduction, Definition, need, signification and scope of Forensic Science. Principles of Forensic Science. Domains in Forensic Science: Forensic Biology, Forensic Medicine, Forensic Toxicology, Forensic Osteology and Odontology, Forensic Physics, Forensic Photography, Ballistics, Fingerprint, Questioned Documents, Forensic Psychology, Forensic Anthropology, Wild life Forensic, DNA profiling, Computer Forensic etc.

Specific contribution of scientists in the field of Forensic Science. Development of Forensic Science in India. National and international scenario of teaching and research institution in Forensic Science. Functions of: Forensic Scientist, Police officers, Prosecution, Judicial Officers and Medico legal expert etc. Problem of proof in Forensic Science, corpus dilecti, modus operandi.

Unit 2: Forensic Science Laboratory and National and International perspective of Forensic Science

Structure and function of State and regional Forensic Science Laboratory, Central Forensic Science Laboratory and facility provided, Mobile Forensic Science Laboratory. Directorate of Forensic Science Service. Police and Forensic scientist relationship, role of FSL in criminal investigation, relationship between forensic expert and judiciary officer, Importance of FSL, National and International scenario of FSL, facilities provided in forensic science laboratory. Ethical issues in FSL.

National perspective of forensic science: Central and Divisional Fingerprint Bureaus, National Crime Records Bureau, Police & Detective Training Schools, Bureau of Police Research & Development, Police Academies, Police dogs.

International perspectives of forensic science: INTERPOL, FBI, CIA, CSI, Ameripol, Europol, Frontex etc.

Unit 3: Policing System and Criminal Justice System in India

Policing style and principles, police power of investigation, filling of criminal charges, community policing a heterogenous society. Introduction to penology, Broad concepts of criminal justice system, Correctional measures and rehabilitation of offenders, Human rights and criminal Justice system in India.

Criminal Justice System in India- Introduction, Administration of Civil and Criminal Laws. Introduction to constitution of India- Fundamental Rights, Indian Penal Code (IPC), Criminal Procedure Code (Cr. PC), Indian Evidence Act (IEA), IT Act-2000, Wild Life Protection Act- 1972, POCSO Act, etc. Indian Courts- Introduction, Hierarchy of courts- Powers of courts, types of courts, Lok Ayukta & Lok Adalat, etc. Role and responsibilities of Public Prosecution – Defence Council -Admissibility of Expert Testimony.



Unit 4: Crime & Criminology

Crime: Definition of crime, history and development, Victimology, criminological perspective, characteristics of crime, classification of crimes, present scenario of crime in India. Criminal and Criminology: Definition of criminology & criminal, classification of criminals, growth of criminology in India, conservative criminology, liberal criminology, radial criminology.

Criminal behaviour: Introduction of criminal behaviour, Theories of criminal behaviour, Ethical issues in forensic science: Definition of ethics, professional standards for practice of Criminalistics, sanction against expert for unethical conduct.

Unit 5: Criminal Psychology

Introduction, Definition & Scope. Mc. Naughten Rule, Insanity in IPC, Sensation and Perception. Gestalt principle of perceptual process. Personality – definition, traits and approaches. Freud's psycho-analytical theory. Personality disorders, delusional disorder, anti-social personality. Psychological Motives and its impact on behaviour. Mental disorder and Mental deficiency as factor in the causation of Crime. Psychological methods of control and rehabilitation of offenders – Psychotherapy and counselling – Victims, Witnesses and Suspects. Polygraphy, Narco Analysis & BEOS in the Criminal Justice System.

Suggested Readings:

1. Henry Lee's Crime Scene Handbook: Henry C Lee
2. Crime Scene Processing and Laboratory Work Book: Patric Jones
3. Forensic Science: An Introduction to Scientific and Investigative Techniques 3rd ed.: Stuart H. James
4. Criminalistics: An Introduction to Forensic Science, 9th edition.: Richard Saferstein
5. Criminal Profiling: An Introduction to a Behavioral Evidence Analysis, 3rd edition.: Brent E. Turvey
6. Forensic Science in Criminal Investigation and Trial, 4th edition.: B.R. Sharma
7. Handbook of Forensic Psychology: Dr. Veer raghavan crime scene, sketching of crime scene, searching, collection, preservation, packing of physical evidence, documentation of crime scene, forwarding or dispatch of exhibit in to the laboratory, chain of custody, collection of standard/reference samples.
8. Crime Scene Management with Special Emphasis on National Level Crime Cases: Dr. Rukmani Krishnamurthy under publishing
9. Richard Saferstein: Forensic science from the crime scene to the crime lab.
10. S.H. James and J.J. Nordby, *Forensic Science: An Introduction to Scientific and Investigative Techniques*, 2nd Edition, CRC Press, Boca Raton (2005).
11. Criminology – Ram Ahuja

Suggested Co-Curricular Activities:

- Visit to FSL and Allied institutions.
- Quiz and seminars on Forensic Science.
- Jurisdiction & Powers of various courts in India.
- Debate on Criminology & its importance
- Case studies and assignments on criminal psychology.



ADIKAVI NANNAYA UNIVERSITY: RAJMAHENDRAVARAM
Single Major (w.e.f:2023-24A.B)

SEMESTER-II

COURSE 3: FORENSIC SCIENCE AND CRIMINOLOGY

Practical

Credits: 1

2 hrs/week

List of Experiments:

1. To study the Do's and Don'ts in the Forensic Science Laboratory.
2. To prepare a poster on various domains of forensic science.
3. To prepare a poster on the contribution of various scientists in forensic science.
4. To prepare a poster on the forensic teaching and research institutes in India.
5. To prepare a case study of famous criminal and civil cases in India.
6. To prepare a poster on the hierarchy and functions of working professionals in Central Forensic Science Laboratory.
7. To study the different forensic science kits available in the Forensic Science Laboratory.
8. To understand the roles of forensic experts of various divisions of the Forensic Science Laboratory. (Role Play)
9. To study the types, causes and rate of crimes in India.
10. To prepare a poster on functions and hierarchy of the Policing System and Criminal Justice System in India.



ADIKAVI NANNAYA UNIVERSITY: RAJMAHENDRAVARAM
Single Major (w.e.f:2023-24A.B)

SEMESTER-II

COURSE 4: FORENSIC DOCUMENT EXAMINATION

Theory

Credits: 3

3 hrs/week

Learning objectives: The student will be able to understand the basics and importance of forensic document examination.

Learning Outcomes of Course: After studying this course the students will know-

- Introduction to Document
- Introduction to Handwriting and Signature
- Introduction to Forgery
- Introduction to Security Documents

Unit I: Basics of Document, Handwriting & Signature Examination

Definition, Types of documents, Essentials to produce document, scope of forensic document examination, document expert, Handling of Documents.

Principles of handwriting, Comparison of handwriting. Development of individuality in handwriting. Natural variations and Factors affecting handwriting, Class and individual characteristics. Standards for comparison of handwriting. Signature Examination.

Unit II: Detection and Decipherment of Forgeries

Definition, Types of forgery, Handwriting & Signature forgeries, Alterations in documents, including erasures, additions, deletions, over-writings and obliterations.

Unit III: Examination of Questioned Documents

Preliminary examination of document. Examination of Printed documents, Type written documents & Xeroxed documents. Examination of Indented writings, Invisible writings & Charred documents. Examination of anonymous letters.

Unit IV: Examination of Security Documents

Definition, Types of security documents, Examination of counterfeit Indian currency notes, passports, plastic cards and stamp papers.

Unit V: Tools and techniques used in document examinations

Tools and techniques needed for forensic documents examination – Stereomicroscope, Projectina Nirvis, Video Spectral Comparator, Electrostatic Detection Apparatus, TLC and Paper chromatography.



ADIKAVI NANNAYA UNIVERSITY: RAJMAHENDRAVARAM
Single Major (w.e.f:2023-24A.B)

Suggested Readings

1. O. Hilton, Scientific Examination of Questioned Documents, CRC Press, Boca Raton (1982).
2. A.A. Moenssens, J. Starrs, C.E. Henderson and F.E. Inbau, Scientific Evidence in Civil and Criminal Cases, 4th Edition, Foundation Press, New York (1995).
3. R.N. Morris, Forensic Handwriting Identification: Fundamental Concepts and Principles, Academic Press, London (2000).
4. E. David, The Scientific Examination of Documents – Methods and Techniques, 2nd Edition, Taylor & Francis, Hants (1997).

Suggested Co-Curricular Activities:

- Visit to Forensic Document Examination Laboratory
- Poster making – Signature Examination
- Seminar on Handwriting Forgery
- Collection of standard samples for examination
- Hands on training on Security Document Examination
- Workshop on Forensic Document Examination



ADIKAVI NANNAYA UNIVERSITY: RAJMAHENDRAVARAM
Single Major (w.e.f:2023-24A.B)

SEMESTER-II

COURSE 4: FORENSIC DOCUMENT EXAMINATION

Practical

Credits: 1

2 hrs/week

List of Experiments:

1. To opine whether given signature samples are written by the same author or not.
2. To extract the handwriting features including class and individual from the given handwriting samples.
3. To opine whether given handwriting samples are written by the same author or not.
4. To identify and examine the exhibits for secret writing.
5. To extract and identify the security features in the Indian Currency Notes.
6. To extract and identify the security features in the debit card and credit card.
7. To extract and identify the security features in the Indian passport.
8. To extract and identify the security features in the stamp papers.
9. To identify and compare the given typewritten document.
10. To identify and compare the given photocopied document.

BLUE PRINT OF MODEL QUESTION PAPER (Sem-End. Examinations)

COURSE NAME

MODEL QUESTION PAPER - THEORY

Semester: ...

Paper:, Title of the paper

Time: 3 Hours.

Max Marks: 70

SECTION – A

Answer any 5 questions. Each question carries 4 marks (5 X 4 = 20M)
(Total 8 questions, questions 1-5 from Units 1-5 & questions 6-8 from any of the units)

1. Unit -I
2. Unit-II
3. Unit-III
4. Unit-IV
5. Unit-V
6. From any Unit
7. From any Unit
8. From any Unit

SECTION – B

Answer all the questions. Each question carries 10 marks. (5 X 10 = 50M)
(Each question (both 'A' or 'B') from each Unit.

9. from Unit I
(OR)
from Unit I

10. from Unit II
(OR)
from Unit II

11. from Unit III
(OR)
from Unit III

12. from Unit IV
(OR)
from Unit IV

13. from Unit V
(OR)
from Unit V