

GUJARAT UNIVERSITY
POST GRADUATE DIPLOMA IN
TOXICOLOGICAL SCIENCES
EFFECTIVE FROM JUNE 2018



DEPARTMENT OF ZOOLOGY, BIOMEDICAL
TECHNOLOGY AND HUMAN GENETICS
UNIVERSITY SCHOOL OF SCIENCES
GUJARAT UNIVERSITY
AHMEDABAD – 380 009

Intake : 10 Students

Fees : Rs.15,000/- per Semester

Eligibility : Graduation in Science with any biological sciences including Medical, Dental, Veterinary & Pharmacy.

Admission, Evaluation, Examination , Results & issuing of Certificate will be as per CBCS System, Rules & Regulations of Gujarat University, Ahmedabad.

TOXICOLOGICAL SCIENCES SYLLABUS FOR CREDIT BASED SEMESTER
SYSTEM - CBCS

<u>NO.</u>	<u>COURSE CODE</u>	<u>NAME OF COURSE</u>	<u>HOURS</u>	<u>CREDITS</u>
1	TOX-S- 401	INSTRUMENTATION & RESEARCH METHODOLOGY	3 + 1	4
2	TOX-S- 402	PRINCIPLES OF TOXICOLOGY	3 + 1	4
3	TOX-S- 403	ENVIRONMENTAL TOXICOLOGY	3 + 1	4
4	TOX-S- 404	TOXICITY TESTING & QUALITY CONTROL	3 + 1	4
5	TOX-S- 405PR	PRACTICAL 1 (Based on Papers TOX-S 401 and 402	6	4
6	TOX-S- 406PR	PRACTICAL 2 (Based on Papers TOX-S 403 and 404	6	4
		TOTAL	28	24
1	TOX-S- 407PT	DISSERTATION AND VIVA-VOCE	20	16
2	TOX-S- 408S	SEMINARS AND INDUSTRIAL/FIELD VISITS	04	04
3	TOX-S- 409M	ASSIGNMENTS AND GROUP DISCUSSIONS	04	04
		TOTAL	28	24
		GRAND TOTAL	56	48

SYLLABUS

POST GRADUATION DIPLOMA IN

TOXICOLOGICAL SCIENCES

TOX-S-401: INSTRUMENTATION AND RESEARCH METHODOLOGY

Unit-1:

Microscopy: General Principles of Microscopy; Light microscopy; Phase contrast microscopy; Fluorescence microscopy; Electron microscopy; Specimen preparation in microscopy; Special techniques in electron microscopy.

Tissue Culture Techniques: Basics of tissue culture; Culture environment; Factors affecting tissue culture; Contamination and its remedies; Cryopreservation; PBLC; Culture initiation and maintenance; Suspension and monolayer cultures; Primary and secondary cultures; Cell lines, Organ culture.

Unit-2:

Cell fractionation, separation and other techniques: Flow cytometry; Centrifugation: Density gradient, Differential, Ultra; Chromatography: Paper, HPLC, TLC, HPTLC, GC; Electrophoresis: Agarose, PAGE, 2DE, PFGE, Capillary electrophoresis; Spectrophotometry: UV-Vis, AAS, GCMS, LCMS.

Unit-3:

Biostatistics: Data organization and representation; Sample size and sampling methods; Measures of central tendency: Mean, Median and Mode; Standard Deviation; Standard error; Probability; Parameters for validation and Quality control; Correlation co-efficient; Regression; 95% Confidence interval; Tests of Hypothesis: Null, Alternative Hypothesis; Tests of Significance: Student's 't' test, Chi square test, F-Test, Fisher's Test; ANOVA; Basics of Non-parametric tests.

Unit-4:

Research Methodology & Bioinformatics: Objectives and types of research, Features of research design and research proposal, Research report writing, Molecular biology basics: Sequences and nomenclature, Sequence databank, Utilization of data base, Analysis Tools, FASTA and

BLAST, Primer designing; Chemical Toxicology Database: TOXNET, NLM, NIS; Chemical Toxicology Analysis Tools: QSAR, DEREK, TOPKAT.

TOX-S-402: PRINCIPLES OF TOXICOLOGY

Unit-1:

Basic Toxicology: General principles and terminology; Types of toxicity; Factors affecting toxicity; Acute, Subacute, Subchronic and Chronic toxicity; LD₅₀, LC₅₀, IC₅₀, EC₅₀; Route of administration; Dose response relationship and its evaluation.

Unit-2:

Toxicants: Classification of toxicants; Metals; Pesticides; Xenobiotics; Teratogens; Food additives and contaminants; Toxins of animal and plant origin; Radiation types, detection and effects.

Unit-3:

Target Organ Toxicity: Toxic responses of Blood, Liver, Kidney, Skin, Immune system, Respiratory system, Nervous system, Ocular and visual system, Heart and vascular system, Reproductive system, Endocrine system.

Unit-4:

Toxicokinetics: Absorption; Digestion; Metabolism; Excretion; Mutagenicity; Carcinogenicity; Teratogenicity; Biotransformation; Bioactivation; Mechanism of Toxicity.

TOX-S-403: ENVIRONMENTAL TOXICOLOGY

Unit-1:

Environmental Toxicology: Environmental risk assessment; Environmental health and hazards; Air pollutants: Past disasters and current condition, Outdoor pollutants, Photochemical oxidants, Indoor air pollutants; Water and soil pollutants: Synthetic persistent chemicals, Inorganic ions, cyanotoxins.

Unit-2:

Ecotoxicology-I: Principle of ecotoxicology; Terrestrial model and ecotoxicity testing: Earthworm, Honey bee, Birds, Plants; Aquatic models and ecotoxicity testing: Algae, Lemna, Daphnia, Brin shrim, Fish.

Unit-3:

Ecotoxicology-II: Route of exposure: Water, Soil, Food; Ecotoxicogenomics: Estrogen receptor, Aryl hydrocarbon receptor, Protein damage, Oxidative stress, DNA damage.

Unit-4:

Applications of Toxicology: Food toxicology and food residues; Analytic/Forensic toxicology; Clinical toxicology; Occupational toxicology.

TOX-S-404: TOXICITY TESTING AND QUALITY CONTROL

Unit-1:

Animal House: Design and construction of animal housing facilities; Caging and housing system; Important factors in animal housing: Illumination, Noise, Ventilation, Temperature, Humidity, Bedding, Water, Food; Health monitoring; Sanitation; Waste disposal; IAC and CPCSEA.

Unit-2:

Toxicity Testing-I: Cell viability and cytotoxicity: Trypan blue dye exclusion assay, MTT assay, WST assay, SRB assay; Genotoxicity: Ames test, TK, HPRT and XPRT mutation test, Chromosomal aberration assay, Comet assay, Micronucleus assay.

Unit-3:

Toxicity Testing-II: Free radical toxicity: Total ROS, LPO, SOD, Catalas, GSH, GPx, Grd, GST; Carcinogenicity testing; Teratogenicity testing, (OECD 473 & 490) Cell lines for toxicity testing: L5178Y, CHO, AS52, V79, TK6, CACO II.

Unit-4:

Guidelines and Quality Standards: National regulatory guidelines: DCGI / CDSCO, FSSAI, GOTS, CPCB / GPCB; International regulatory guidelines: US FDA, OECD, US EPA, ICH, Food safety, TTC; National and international quality standards: NABL, OECD GLP, ISO.

TOX-S – 405 PR : Practicals based on papers TOX-S 401 and 402

TOX-S – 406 PR : Practicals based on papers TOX-S 403 and 404

TOX-S – 407PT: Dissertation and Viva – voce

TOX-S – 408S : Seminars and Industrial visits

TOX-S – 409M : Assignments and Group Discussions