

## **Course and Curriculum of M.D. IN Forensic Medicine and Toxicology** **(Goa University)**

### CHAPTER 1

#### GOALS & OBJECTIVES OF COURSE

##### A. PROGRAMME GOALS:

This programme aims at training a competent expert in Forensic Medicine and Medical Toxicology.

##### B. PROGRAMME OBJECTIVES

This programme aims at training an expert in Forensic Medicine & Medical Toxicology who at the end of the training will be able to:

1. Identify and define the existing as well as future Medico-legal problems as they emerge in the community and work to resolve such problems by planning, implementing, evaluating and modulating Medico-legal services.
2. Undertake Medico-legal responsibilities and discharge Medico-legal duties, which arise in day-to-day general practice as well as in hospitals.
3. Keep himself/herself abreast with all recent developments and emerging trends in the field of Medical Ethics and the Law.
4. Evaluate his professional activities, educational needs and select appropriate learning resources periodically.
5. Deals with general principles and practical problems related to forensic, clinical, emergency, environmental, medico-legal and occupational aspects of Toxicology.
6. Impart education in Forensic Medicine and Toxicology to under-graduate and post-graduate students with the help of modern teaching aids.

##### C. STUDENT ELIGIBILITY CRITERIA AND SELECTION METHOD

1. Medical Graduates with MBBS or equivalent medical degree from a recognized University in India after the completion of their internship and who are registered with the Goa Medical Council / Indian Medical Council are eligible to apply.
2. Selection of students will be as per the existing regulations of Goa Medical College, Medical Education Rules..

##### D . SPECIFIC OBJECTIVES

At the end of the MD course, a post-graduate student should be able to:

1. Perform Medico-legal autopsy independently with required physical assistance, prepare report and derive inferences.
2. Interpret histo-pathological, microbiological, radiological, chemical analysis, DNA analysis and other investigative reports for Medico-legal purposes.
3. Depose as an expert witness in a Court of Law on Medico-legal matters.
4. Describe relevant legal/court procedures applicable to Medico-legal/medical practice.
5. Identify, examine and prepare reports on Medico-legal cases.
6. Identify and discharge all legal responsibilities in Medico-legal matters.
7. Plan, Organize and supervise Medico-legal work in general/teaching hospitals.
8. Interpret, analyze & review Medico-legal reports prepared by other Medical Officers.
9. Collect, preserve and dispatch various trace evidences to the concerned authority.
10. Identify and articulate medical ethics in relation to the patient, profession, society, state and humanity at large.
11. Interpret and advice authorities on matters related to Medical Ethics and the Law.
12. Discharge his duties in respect of forensic, clinical, emergency, environmental, medico-legal and occupational aspects of Toxicology.
13. Plan, Organize and manage Toxicological Laboratory services.
14. Provide information and consultation on all aspects of toxicology to professionals, industry, Government and public

### CHAPTER 2

#### CONCEPTUAL FRAMEWORK OF COURSE

## TIME IN YEARS

Year	Term	Month			
I	1ST	0-6 Unit 0	Introduction to general principles in FORENSIC MEDICINE & TOXICOLOGY	Continuous Guidance	Thesis protocol submission
			Development of basic AUTOPSY SKILLS		
			THESIS-TOPIC SELECTION		
			Documentations		
	2nd	7-12 Unit 1	Clinical Forensic Medicine		
			Orientation to basic Forensic Sciences		
			Autopsy work		
			Attend court summons		
II	3rd	13-18 Unit 2	DNA Fingerprinting		
			Researches, analysis and presentation of DATA		
			Medico-legal work in casualty.		
			Patho, Micro ad Toxicology lab work.		
			Attend court /summons		
	4th	19-24 Unit 2	All aspects of Toxicology & Sexual offences		
			(COLLECTION, PRESERVATION, TRANSPORTATION, ANALYSIS OF BIOLOGICAL SAMPLES )		
III	5th	25- 30 Unit 2	Autopsy work Clinical Forensic Medicine		Submission of draft of thesis
	6th	31-36 Unit 2			Final assessment

## MODULES

UNIT 0
(UPTO 6 MONTHS)
A. Introduction to basics
1. Orientation Programme
2. Basic autopsy skills.
3. General Principles of Forensic Medicine.
4. Introduction to Medical Toxicology.
B. Organized Teaching Session.
1. Attend and participate in undergraduate classes.
C. Posting for autopsy work, Clinical Forensic Medicine and Toxicology
D. Orientation to Organization and functioning of Toxicology Lab.
E. Preparation of Thesis protocol.
F. Introduction to advanced techniques – DNA Fingerprinting.
UNIT 1 (6 – 12 MONTHS)
A. Clinical Forensic Medicine work for practical experience in Medico legal procedures and on the job practical training in the Medico-legal aspects of emergency medicine, radiology and other clinical disciplines.
B. Orientation to the applied aspects of Anatomy, Physiology Biochemistry, Microbiology, Pathology, Blood Bank, Psychiatry and Central Forensic Science Laboratory.
C. Organized teaching session.
1. Undergraduate classes (Attend & participate)
2. Journal review/Review of latest advances - once a fortnight
3. Autopsy case discussion & Gross Autopsy Conference - once a fortnight
4. Clinical forensic medicine case discussion - once a fortnight

5. Seminars - once a week
6. Toxicology conference - once in a month
D. Thesis Work and other research work.
E. Posting for Autopsy work, Clinical Forensic Medicine and Toxicology Laboratory.
F. Attend Court summons for cases conducted by themselves or when deputed where an expert is required to depose by Court of Law.
UNIT 2 (12-36 MONTHS)
A. Organized teaching session.
1. Attend and participate in undergraduate classes.
2. Journal review - once a fortnight
3. Autopsy case discussion - once a fortnight
4. Clinical forensic medicine case discussion - once a fortnight
5. Seminars - once a fortnight
6. Toxicology conference - once in a month
B. Submission of Thesis six months prior to examination.
C. Posting for autopsy work, clinical Forensic Medicine and Toxicology laboratory to continue.
D. Attend court summons for cases conducted by themselves or when deputed where an expert is required to depose by Court of Law.

### CHAPTER 3

#### SUBJECT CONTENT

##### I. ORIENTATION PROGRAMME

- A. Familiarization with the philosophy and guiding principles of MD Forensic Medicine and Toxicology course at Goa Medical College.
- B. Identify the programme goals, specific objectives and conceptual framework for his/ her course.

##### II. BASIC AUTOPSY SKILLS

- A. Outline & demonstrate the principles and objectives of postmortem examination, formalities and procedures of medico-legal autopsies in accordance with existing conventions and the law.
- B. Describe and demonstrate the methods of preservation of viscera.

##### III. General principle of Forensic Medicine and Toxicology

- A. The candidate is expected to have sound Basic Medical Sciences in relation to Forensic Medicine & Toxicology and to identify the role of anatomy, physiology, biochemistry, microbiology, pathology, blood bank, psychiatry, radiology, forensic science laboratory and other disciplines of medical science to logically conclude in Medico-legal autopsies and examination of Medico-legal cases.
- B. The training programme shall include seminar, Journal reviews discussions, self study from textbooks, reference books, reviews and journals of specialty and allied subjects. He / she shall undergo training in the concerned departments related to the subjects like Pathology, Anatomy, Radiology, Forensic Science Laboratory etc.
- C. Describe the basic principles of the techniques used in toxicological laboratory namely TLC, GLC, ASS, HPLC, and Breath Alcohol Analyzer.
- D. Process biological samples for DNA fingerprinting.
- E. Execute the skills and knowledge mentioned in objectives of Forensic Medicine for MBBS course Goa Medical College.

##### IV. BASIC SCIENCES

###### A. Anatomy :

- (i) Gross anatomy of the muscles, skeletal system, outlines of embryonic/foetal development and histological structures of different organs and tissue.
- (ii) Forensic Anthropology: Surface landmarks of anthropological significance, Identification techniques in living and dead, anthropometry related to skull and individual bones, comparative Osteology identification of human and common domestic and wild animals from skeletons.
- (iii) Forensic Odontology : Teeth and identification – racial features, sex, effects of occupation and habits and socio-economical status; Teeth and crime – bite marks, Teeth and trauma – accidental injuries and criminal assaults.

B. Physiology: Functions of the circulatory, respiratory, haemopoetic, nervous, digestive, endocrine, reproductive, excretory, muscle and skeletal systems and physiology of thermal regulations.

C. Biochemistry: Post-mortem chemistry of blood and other body fluids.

D. Immunology: Fundamentals of immunology-immunoglobulins, immunological principals, terms and theories of antigens, antibodies compliments, Cellular antigens and blood group systems and the mendelian inheritance.

E. Microbiology: Microbiology related to Forensic Medicine and entomology of Cadavers.

G. Pathology:

- 1) Apply the principles involved in methods of identification of human remains by race, age, sex, religion, complexion, stature, hair, teeth, anthropometry, dactylography, foot prints, hairs, tattoos, horoscopy and superimposition techniques.
- 2) Perform medico-legal postmortem and be able to exhume, collect, preserve and dispatch specimens or trace evidence to the appropriate authority.
- 3) Diagnose and describe the pathology of wounds, mechanical and regional injuries, ballistics and wound ballistics, electrical injuries, neglect and starvation, thermal injuries, deaths associated with sexual offences, pregnancy, delivery, abortion, child abuse, Battered babies, SIDS, dysbarism and barotraumas.
- 4) Describe patho-physiology of shock & neurogenic shock.
- 5) Describe the patho-physiology of asphyxia, classification, medico legal aspects and postmortem findings of different types of asphyxia deaths.
- 6) Diagnose and classify death, identify the signs of death, postmortem changes, interpret the autopsy findings, artifacts and results of the other relevant investigations to logically conclude the cause, manner (suicidal, homicidal and accidental) and time of death.
- 7) Manage medico-legal responsibilities in mass disasters involving multiple deaths like fire, traffic accident, aircraft accident., rail accident and natural calamities.
- 8) Demonstrate postmortem findings in infant death to differentiate amongst live birth, still birth and dead born.
- 9) Perform postmortem examination in cases of death in custody, torture and violation of human rights.
- 10) Perform postmortem examination in cases of death due to alleged medical negligence as in Operative and Anesthetic Deaths.
- 11) Discuss on relation between trauma and disease.
- 12) Discuss on organizations to be adopted in disasters involving multiple deaths (e.g. fire, rail and aircraft accidents).

H. Radiology- Adequate knowledge of Radiological procedures for solution of medico legal problems.

## V. CLINICAL FORENSIC MEDICINE

- A. Examine, assess legal implications and prepare report or certificate in cases of physical assault, suspected drunkenness, sexual offences, consummation of marriage and disputed paternity .Collect, preserve & dispatch the specimen/material to the concerned authority and interpret the clinical
- B. and laboratory findings which are reported.
- C. Examine injured person, prepare Medico-legal report and initiate management.
- D. Determine the age of a person for medico-legal purpose.
- E. Examine a person and assess disability in industrial accidents and diseases.
- F. Perform examination and interpret findings for medico legal purposes in cases pertaining to pregnancy, delivery, artificial insemination, abortion, sterilization, impotence & AIDS.
- G. Describe normal and abnormal sexual behavior and its medico-legal implications.
- H. Examine and assess the medical fitness of a person for insurance, government service, sickness and fitness on recovery from illness.
- I. Examine medico-legal problems related to clinical disciplines of Medicine & allied subjects, Paediatrics, Surgery & allied subjects, ENT, Ophthalmology, Obstetrics & Gynaecology, Dermatology and Anesthesiology.

## VI. FORENSIC PSYCHIATRY

- A. Explain the common terminologies of Forensic importance in Psychiatry.
- B. Describe the Medico-legal aspects of Psychiatry and mental health.
- C. Describe medico-legal aspects of Drug addiction.
- D. Describe role of Psychiatry in crime investigation, punishment and trial.

E. Describe the civil and criminal responsibilities of an insane person.

## VII. MEDICAL TOXICOLOGY

- A. Describe the law relating to poisons, drugs, cosmetics, narcotic drugs and psychotropic substances.
- B. Examine & diagnose the poisoning cases and apply principles of general management and organ
- C. system approach for the management of poisoning cases.
- D. Describe the basic principles of toxicokinetics and toxicodynamics of poisonous substances.
- E. Describe the toxic hazards of occupation, industry, environment and the principles of Predictive Toxicology.
- F. Collect, preserve and dispatch the material for analysis, interpret the laboratory findings and perform the Medico-legal formalities in a case of poisoning.
- G. Demonstrate the functioning of TLC, GLC, HPLC, ASS and Spectro-photometer.
- H. Demonstrate the methods of identification and analysis of common poisons prevalent in this region.
- I. Describe the signs, symptoms, diagnosis and management of common acute and Chronic poisoning due to –
  - a. Corrosives
  - b. Nonmetallic Substances
  - c. Insecticides and Weed Killers
  - d. Metallic Substances
  - e. Vegetable and Organic irritants
  - f. Somniferous Compounds
  - g. Inebriant substances
  - h. Deliriant Substances
  - i. Food contamination/adulteration..
  - j. Substance causing Spinal and cardiac toxicity
  - k. Substances causing Asphyxia (Asphyxiants)
  - l. Household toxins
  - m. Toxic envenomation
  - n. Biological and Chemical warfare.

## VIII. CRIMINOLGY, CRIMINAL LAW:

3. Criminology and criminal law, statistical studies of crime (indices of crime)
4. Perspectives and methods in criminology
5. Sociological theory of criminal behavior, crime and social institutions, crime processes in criminal behavior, behavior systems in crime, variations in punitive policies, punitive policies and social structures.
6. The treatments of criminals, criminal courts, Juvenile courts, probation objectives and conditions of imprisonments, prison community, prison labor, release from prison, prevention of crime and delinquencies.
7. Relevant parts of IPCs, CrPCs, IEAs.

## IX. FUNDAMENTALS OF FORENSIC SCIENCES

- A. Describe the general forensic principle of ballistics, serology, analytical toxicology and photography.
- B. Interpret the scene of crime.
- C. amine – bloodstains for blood grouping, seminal stains & hair for medico-legal purpose.
- D. Forensic Photography
- E. Thermal Injuries, Asphyxial deaths, sexual offences and related subjects.
- F. Crime laboratory organization and various scientific techniques related to expert scientific evidence.

## X. MEDICAL ETHICS & LAW (MEDICAL JURISPRUDENCE)

- A. Describe the history of Forensic Medicine
- B. Describe the Legal and Medico-legal system in India.

- C. Describe medical ethics and the law in relation to medical practice, various declarations, Medical Council of India, disciplinary control, duties of a registered medical practitioner, consent, confidentiality, medical negligence and consumer protection act.
- D. Describe medical ethics and law in relation to organ transplantation, biomedical human research and experimentation, human rights and citizen charter.
- E. Describe the ethics and law in relation to artificial insemination, abortion, antenatal sex, fetus, genetics, and euthanasia.
- F. Interpret the ethics and law applicable to the animal experimentation.
- G. Describe ethics in relation to aged, women and children.
- H. Describe medical ethics and law in relation to nursing and other medical services.
- I. Modern trends in Forensic Medicine and Toxicology.

#### TECHING – LEARNING EXPERIENCES

- A. Undergraduate classes
- B. Posting for
  1. Autopsy work
  2. Clinical Forensic Medicine
  3. Clinical toxicology
  4. Allied subjects
- C. Journal review
- D. Autopsy Case Discussion
- E. Clinical Forensic Medicine Case Discussion
- F. Seminar on Clinical & Autopsy case problems
- G. Problem solving discussion on cases for expert opinion.

#### THESIS FOR FORENSIC MEDICINE & TOXICOLOGY

##### Objectives

1. The student should be able to demonstrate capability in research by planning and conducting systematic scientific inquiry & data analysis and deriving conclusion.
2. Communicate scientific information for health planning.

##### Guide for Thesis

1. Chief guide should be from the Department of Forensic Medicine & Toxicology.

##### Submission of Thesis Protocol

It should be submitted within stipulated time by Goa University after admission in the course.

1. Protocol in essence should consist of:

- (a) Introduction and objectives of the research project.
- (b) Brief review of literature.
- (c) Suggested materials and methods, and
- (d) Bibliography

2. The protocol must be presented in the Department of Forensic Medicine & Toxicology before being forwarded to the office of the Dean.

3. Protocol will be approved in accordance with the existing regulations of the Goa Medical College and /or Goa University.

##### Submission of Thesis:

1. Thesis will be submitted within stipulated time (as per Goa University Rules) prior to examination.

2. Thesis in essence should consist of

- (a) Introduction
- (b) Review of literature
- (c) Aims and objectives
- (d) Material and methods
- (e) Results
- (f) Discussion
- (g) Summary and Conclusions
- (h) Bibliography

Evaluation of Thesis: Thesis will be evaluated in accordance with the existing regulations of the Goa University.

**ASSESSMENT**

Assessment of candidates on completion of MD course will be carried out in accordance with the existing rules and regulations of the Goa University and Goa Medical College.

All candidates will be examined and evaluated under the following Heads:

A) Theory - Will consist of four papers as under:

Paper I - Basic Medical Sciences and allied subjects in relation to Forensic Medicine & Toxicology.

Paper II - Clinical Forensic Medicine, and Toxicology including Forensic Psychiatry

Paper III – Shall deal with criminology, Criminal Laws, Forensic Science and Forensic Medicine.

Paper IV – Shall deal with Medicine laws & Ethics, recent advances in Forensic Medicine and Toxicology.

B) Practical Examination:

The practical examination with Viva –voce examination shall be for 3 days. The practical examination should be of three sub-headings. The following exercises are included in the practical.

- a) Laboratory Examination: Microscopic slides and other exhibits of Medico-legal importance, staining of tissue sections and reporting of skiagrams, weapons and specimen of Toxicology, skeletal remains examinations (Table I, II & III).
- b) Clinical Forensic Medicine: Examination of injury case, age verification, Sexual Offences, drunkenness and expert opinion. (Two short cases )
- c) Autopsy examination (One long case )

C) GRAND VIVA & Discussion on thesis.

**PRACTICAL EXAMINATION PROGRAMME IN MD EXAMINATION IN FORENSIC MEDICINE & TOXICOLOGY**

(Three days)

Sr. no.			Duration	
I II.	PRACTICAL	1	Long Case ..... 1. Autopsy ..... 100 marks	2 hours
		2	Short Cases ... 2. .... 30 marks each	
			a. Examination of person for Age / injury	1 hour
			b. Examination of person for S.O. / Drunkenness	1 hour
		c. Expert Opinion ..... 40 marks	1 hour	
III.	TABLE WORK	1.	Table no. 1 .....30 marks	45 mins
			a. Gram staining	
			b. H.E. Staining	
			c. Blood grouping	
		2.	Table no. 2 .....40 marks	45 mins
			a. Radiological films (three)	
			b. Photographs (three)	
			c. Wet specimen (three)	
		3.	d. Slides (three)	
			Table no. 3 .....30 marks	45 mins
	a. Weapons (Three)			
	b. Bones (Three)			
	c. Toxicological specimen (Four)			
IV.	ORALS / Thesis discs	..... 100 marks		
	Total	..... 400 marks		

Time table for practical exams:

DAY	TIME	EXERCISE	
1	9.00 a.m.	Long Case..... Autopsy	2 hours
	2.00 p.m.	Short Case 1 ..... Age / Injury	1 hour
	2.45 p.m.	Short Case 2 ..... S.O / Drunkenness	1 hour
2	9.00 a.m.	Table work ..... Table 1	45 mins
	10.00 a.m.	Table work ..... Table 2	45 mins
	11.00 a.m.	Table work ..... Table 3	45 mins
	2.00 p.m.	Short Case ..... Expert Opinion	1 hour
3	9.00 a.m.	Grand Viva with thesis discussion	2 hours

Note: The theory, practical and viva shall constitute separate heads of passing and a candidate must obtain an average minimum “200” marks in each head of passing. Further in theory each paper shall constitute a sub-head and in practical there shall be three subheadings.

## CHAPTER 4

**LOG BOOK & INTERNAL POSTINGS****Log Book**

The log has been prepared to maintain a record of academic and service activities of Post Graduate Student and account of progress made by him.

Maintenance of such logbook also allows a review of PG training programme and incorporation of improvements in programme.

PG students are required to carry the logbook and get the entries made regularly Faculty is requiring to countersign. The logbook has to be submitted to the Head of the Department from time to time. The log book shall has record of a) Journal Club: attended/participated b) Seminars : attended/participated c) Group discussions d)Assigned exercises e) Record of intrinsic and Extrinsic posting f) Details of Medico-legal works : conducted / assisted /observed g) Details of Clinical meetings/conferences h) Record of bed side demonstrations i)Details of statistical/Departmental Mortality Meetings j) Teaching : UG/ PG etc. k)Progress of thesis work l) Details of leave availed.

**Internal Posting of Postgraduate in M.D. Forensic Medicine:**

All the posting will be done in addition to their routine medico-legal work in the department i.e. doing Medico-legal duties, teaching and the other assigned duties of the department.

Department/Period			
1. Casualty			
Casualty	01 mth		They will work under the supervision of the Casualty Medical Officer. They will prepare independent reports for academic medico-legal purposes. This include injury cases, poisoning, age certification, examination of weapon etc.
2. Ward postings:			
A. MEDICAL			
Medicine & Psychiatry	02 wks		They will observe poisoning and other medico-legal cases and the preservation of the samples and get acquainted with modern drugs. Study psychiatry cases and their certification.
B. SURGERY			
i.	Ortho	01wk	They will study medico-legal cases admitted and referred to Dept. of Surgery, maintaining record of such cases.
ii.	Burns	01wk	
iii.	Dental	01wk	
C. OBG. & GYN.			
OBG. & GYN.	01wk		They will concentrate on cases of Sexual Offences, abortion and sterilization and other cases of Medico-legal importance. During posting they will work under supervision of the unit I/C and the Professor and will prepare a record of the cases for the academic purposes.
3. OTHER DEPARTMENTS			
a.	Anatomy	02 wks	They will concentrate on the different aspects of preservation of a dead body, the examination of bones for medico-legal purposes and the examination fragmentary remains. They will work under the supervision of Unit I/C and or the Professor, and will prepare a record of the case for academic purposes.
b.	Biochem/Physio	02 wks	They will concentrate on and get acquainted with Forensic Biochemistry, Physiology and equipment used for the same.
c.	Pathology	02 wks	They will concentrate on and get acquainted with Forensic Pathology and Histo-pathology and various techniques/procedures and equipment used for the same.
d.	Microbiology	02 wks	They will concentrate on and get acquainted with various techniques/procedures in Microbiology and equipment used for the same.
e.	Radiology	01wk	They will concentrate on and get acquainted with various techniques/procedures done Dept. of Radiology and equipment used for the same.
f.	Forensic Science Laboratory	02 wk	They will concentrate on and get acquainted with various techniques/procedures done in Forensic Science Laboratory and equipment used for the same, including those used in serological and toxicological examination and the examination of the trace material of Medico-legal importance.
g.	Finger Print/ document and ballistic	01 wk	They will concentrate on and get acquainted with various techniques/procedures done in Finger Print/ document and ballistic and equipment used for the same, including those used in serological and toxicological examination and the examination of the trace material of Medico-legal importance.



Schedule of practical works: For M.D. in Forensic Medicine & Toxicology			
Sr. no.	Practical work	Minimum no. cases to be recorded	
		M.D.	D.F.M.
01.	Autopsy	200	100
02	Histo-pathology of autopsy cases	25	10
03	Injury examination & certification		
	a. OPD Cases	50	25
	b. Indoor	50	25
04	Alcohol examination and Certification	10	10
05	Sex offences examination and reporting	10	10
06	Poisoning cases & follow up	25	10
07	Blood examination	10	10
08	Examination of photographs	25	25
09	Expert opinion	25	10
10	Age determination	25	10
11	Psychiatric cases	10	10
12	Court evidence / attendance	25	10
13	Visiting scene of crime	5	2
14	Examination of bones	10	10
15	Examination of weapons	10	10
16	Examination of cloths	10	10
17	Visit to the departments of other colleges	5	3
18	Attendance of CME/Conf/Workshop	2	2
19	No. of UG/Intern/other. Teaching hrs Participation/theory and practical	50	50



