M.D Curriculum
Forensic Medicine & Toxicology

DEPARTMENT OF FORENSIC MEDICINE & TOXICOLOGY
AIIMS, Nagpur

Syllabus and Curriculum

MD in Forensic Medicine & Toxicology

The **Goal** of MD Forensic Medicine & Toxicology is to train a doctor to become a competent medico-legal expert, teacher and researcher in the subject who:

1. is aware of medico legal aspects in various settings
2. is aware of contemporary advances and developments in the field of Forensic Medicine.
3. has acquired the competencies pertaining to the subject of Forensic Medicine that are required to be practiced at all levels of health system.
4. is oriented to the principles of research methodology.
5. has acquired skills in educating and imparting training to medical, paramedical and allied professionals.

**Program Outcomes**

A post graduate student, upon successfully qualifying in the M.D (Forensic Medicine & Toxicology) examination, should be able to:

1. Acquire knowledge on the philosophy and guiding principles of Forensic Medicine course.
2. Acquire knowledge and perform medico-legal autopsy independently with required physical assistance, prepare report and derive inferences.
3. Acquire knowledge and perform medico-legal examination of users of alcohol, drugs and poisons and prepare report.
4. Acquire knowledge and perform medico-legal examination in cases of sexual offences and prepare report.
5. Interpret histo-pathological, microbiological, radiological, chemical analysis, DNA profile and other investigative reports for medico-legal purposes.
6. Perform medico-legal examination of bones, clothing, wet specimens and weapons.
7. Describe relevant legal/court procedures applicable to medico-legal/medical practice.
8. Depose as an expert witness in a court of Law on medico-legal matters.
9 Identify the role of anatomy, physiology, biochemistry, microbiology, pathology, blood bank, psychiatry, radiology, forensic science laboratory as well as other disciplines of medical science to logically arrive at a conclusion in medico-legal autopsies and examination of medico-legal cases.

10 Examine, identify, prepare reports and initiate management on medico-legal cases in emergency set up.

11 Collect, preserve and dispatch various samples and trace evidences to the concerned authorities in appropriate manner.

12 Help and advise authorities on matters related to medical ethics and medico-legal issues.

13 Plan, organize and manage toxicological laboratory services in any health care set up.

14 Manage medico-legal responsibilities in mass disasters involving multiple deaths like fire, traffic accident, aircraft accident, rail accident and natural calamities.

15 Participate in various workshops/seminars/journal clubs/demonstration in the allied departments, to acquire various skills for collaborative research.

16 Describe the principles of the techniques used in toxicological laboratory namely TLC (Thin Layer Chromatography), GLC (Gas Liquid Chromatography), AAS (Atomic Absorption Spectrophotometry), HPLC (High Performance Liquid Chromatography) and Breath Alcohol Analyzer.

17 Impart education in Forensic Medicine and Toxicology to under-graduate and post-graduate students with the help of modern teaching aids.

Time frame to acquire knowledge & skills

A. First year of PG programme:

1 Orientation Programme
2 Basic autopsy skills.
3 Orientation to the applied aspects of Anatomy, Physiology, Biochemistry
4 General principles of Forensic Medicine.
5 Introduction to Medical Toxicology.
6 Assisting in scheduling of teaching sessions.
7 Participation in undergraduate teaching.
8 Posting for autopsy work, clinical forensic medicine and toxicology.
9 Participation in seminar, CME, workshop etc.
10 Preparation of thesis protocol.
11 Administrative & Communication skills at Mortuary.

B. Second year of PG programme:
1 Conduct of autopsy examination independently in routine autopsy cases.
2 Conduct of autopsy examination with supervision in expert opinion cases.
3 Conduct of theory and practical sessions for undergraduates.
4 Thesis and other research work.
5 Clinical forensic medicine work for practical training in medico-legal procedures in emergency medicine, radiology and other clinical disciplines.
6 Attend court summons for cases conducted by themselves or where deputed to attend in cases where an expert is required to depose by Court of Law.
7 Present prototype case through moot court activity.

C. Third year of PG programme:
1 Organize teaching sessions and thesis work.
2 Submission of thesis six months prior to examination.
3 Posting for autopsy work, clinical forensic medicine and toxicology laboratory to continue.
4 The PG trainee shall be required to conduct minimum of 100 autopsy cases and minimum of 100 clinical cases during the entire training period.
5 Attend Court summons for cases conducted by themselves or when deputed where an expert is required to depose by the Court of Law.
6 The PG trainee shall be required to attend or accompany an expert to attend a minimum of 20 court summons, of which at least 5 should pertain to clinical cases.

Syllabus

Course contents:
I. General Principles of Forensic Medicine and Toxicology
i. Identify the role of anatomy, physiology, biochemistry, microbiology, pathology, blood bank, psychiatry, radiology, forensic science laboratory as well as other disciplines of medical science to logically arrive at a conclusion in medico-legal autopsies and examination of medico-legal cases.
ii. Describe the basic principles of techniques used in toxicological laboratory namely TLC, GLC, ASS, HPLC and Breath Alcohol Analyzer.
iii. Execute the skills and knowledge expected at undergraduate level.
II. Basic Sciences and allied Subjects

A. Anatomy: Anatomy of parts and organs of the body which are important from the medico-legal aspect.

i. Describe surface and regional anatomy of head, neck, chest and abdomen.

ii. Describe gross anatomy and blood supply of heart, brain, lungs, spleen, liver and kidneys.

iii. Describe gross anatomy of male and female genitalia.

iv. Describe the comparative anatomy of male and female skeleton.

v. Perform histological examination of various tissues.

vi. Describe the development of foetus.

B. Physiology and Biochemistry: Mechanism of phenomena those are important in the body from the medico-legal viewpoint.

i. Describe mechanism of fluid and electrolyte balance, thermoregulation in newborn and adults, endocrine functions.

ii. Describe physiology of sexual behaviour.

iii. Describe physiological functioning of circulatory system, digestive system, respiratory system, haemopoietic system, central nervous system and reproductive system including pregnancy.

C. Pathology: Pathophysiology of vital processes and response mechanisms that modulate tissue and organ reaction to all forms of injury and have a bearing on antemortem and postmortem appearance in medico-legal cases, assessment of the duration of injuries and correlate trauma and disease.

i. Describe pathology of inflammation and repair, immunity and hypersensitivity,

ii. Thrombosis and embolism, electric and ionizing radiation injuries, genetic factors in disease, deficiency disorders and malnutrition.

iii. Describe pathology of myocardial infarction, congenital heart diseases, tuberculosis of lungs, cirrhosis of liver, diseases of glomeruli and tubules and interstitial; tissues of Kidney, tumours, endocrine disorders, venereal diseases, spontaneous intracranial hemorrhages.

iv. Describe the pathology of sudden death.

v. Describe local and systemic response to trauma and patho-physiology of shock.
vi. Describe pathology of common infections and infestations of medico-legal significance.

D. Dentistry: Adequate knowledge of dentistry for solution of medico-legal problems like, injuries, age determination and identification

E. Radiology: Adequate knowledge of radiological procedures for solution of medico-legal problems.

F. Fundamentals of Forensic Medicine:
   i. Describe the general forensic principle of ballistics, serology, analytical toxicology and photography.
   ii. Interpret the scene of crime & crime scene investigation.
   iii. Describe role of DNA profile and its application in medico-legal practice.
   iv. Examine bloodstains for blood grouping, nuclear sexing, HLA typing, seminal stains and hair for medico-legal purpose.
   v. Describe ethical aspects of Forensic Procedures including Narco-analysis, Brain mapping and Polygraph

III. Medical Ethics and Law (Medical Jurisprudence)
   i. Describe the history of Forensic Medicine.
   ii. Describe the legal and medico-legal system in India.
   iii. Describe medical ethics and the law in relation to medical practice, declarations, oath, etiquette, Medical Council of India, disciplinary control, rights and duties of a registered medical practitioner’s professional misconduct, consent, confidentiality, medical negligence (including all related issues) and Consumer Protection Act.
   v. Describe the ethics and law in relation to artificial insemination, abortion, antenatal sex, foetus, genetics and euthanasia.
   vi. Interpret the ethics and law applicable to the human (clinical trials) and animal experimentation.
   vii. Describe ethics in relation to elderly, women and children.
viii. Describe various scenarios of negligence cases and how to proceed in it.

IV. Clinical Forensic Medicine

i. Examine, assess legal implications and prepare report or certificate in cases of physical assault, suspected drunkenness, sexual offences, consummation of marriage and disputed paternity.

ii. Collect, preserve and dispatch the specimen/material to the concerned authority and interpret the clinical and laboratory findings which are reported.

iii. Examine injured person, prepare medico-legal report and initiate management.

iv. Determine the age and establish identity of an individual for medico-legal purpose.

v. Examine a person and assess disability in industrial accidents and diseases.

vi. Perform examination and interpret findings for medico-legal purposes in cases pertaining to pregnancy, delivery, artificial insemination, abortion, sterilization, Impotence, AIDS and infectious disease.


viii. Examine and assess the medical fitness of a person for insurance, government service, sickness and fitness on recovery from illness.

ix. Examine medico-legal problems related to clinical disciplines of medicine and allied subjects, Pediatrics, Surgery and allied subjects, ENT, Ophthalmology, Obstetrics and Gynaecology, Dermatology and Anaesthesiology.

x. Examine medico-legal problems related to children, women and elderly.

xi. Identify the cases of torture and violation of human rights and issues thereto

V. Forensic Pathology

i. Apply the principles involved in methods of identification of human remains by race, age, sex, religion, complexion, stature, hair, teeth, anthropometry, dactylography, footprints, hairs, tattoos, poroscopy and superimposition techniques.

ii. Perform medico-legal postmortem and be able to exhume, collect, preserve and dispatch specimens or trace evidence to the appropriate authority.

iii. Diagnose and describe the pathology of wounds, mechanical and regional injuries, ballistics and wound ballistics, electrical injuries, lightening, neglect and starvation, thermal injuries, deaths associated with sexual offences, pregnancy, delivery, abortion, child abuse, dysbarism and barotraumas.

iv. Describe patho-physiology of shock and neurogenic shock.
v. Describe patho-physiology of asphyxia, classification, medico-legal aspects and postmortem findings of different types of asphyxial deaths.

vi. Diagnose and classify death, identify the signs of death, Forensic Taphonomy (postmortem changes), Forensic entomology, interpret autopsy findings, artefacts and results of the other relevant investigations to logically conclude the cause, manner (suicidal, homicidal and accidental) and time of death.

vii. Manage medico-legal responsibilities in mass disasters involving multiple deaths like fire, traffic accident, aircraft accident, rail accident and natural calamities.

viii. Demonstrate postmortem findings in infant death and to differentiate amongst livebirth, still birth and dead born.

ix. Perform postmortem examination in cases of death in custody, torture and violation of human rights.

x. Perform postmortem examination in cases of death due to alleged medical negligence as in operative and anaesthetic deaths.

xi. Perform postmortem examination in cases of death due to virus affected bodies (HIV, Rabies, SARS, COVID-19)

xii. Describe Verbal autopsy and Virtual autopsy.

xiii. Describe Humanitarian Forensic and role of Forensic Expert in Disaster management.

VI. Toxicology

i. Describe the law relating to poisons, drugs, cosmetics, narcotic drugs and psychotropic substances.

ii. Examine and diagnose poisoning cases and apply principles of general management and organ system approach for the management of poisoning cases.

iii. Describe the basic principles of pharmacokinetics and pharmaco dynamics of poisonous substances.

iv. Describe the toxic hazards of occupation, industry, environment and the principles of predictive toxicology.

v. Collect, preserve and dispatch material/s for analysis, interpret the laboratory findings and perform the Medico-legal formalities in a case of poisoning.

vi. Demonstrate the methods of identification and analysis of common poisons.

vii. Describe the signs, symptoms, diagnosis and management of common acute and chronic poisoning due to:

a. Corrosives
b. Non-metallic 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. Substances causing spinal and cardiac toxicity  
k. Substances causing asphyxia (Asphyxiants)  
l. Toxic envenomation  
m. Biological and chemical warfare  
n. Environmental intoxicants  
o. Occupational intoxicants

VII. Forensic Psychiatry  

i. Explain the common terminologies of forensic importance in Psychiatry.  
ii. Describe the medico-legal aspects of Psychiatry and mental health.  
iii. Describe medico-legal aspects of drug addiction.  
iv. Describe role of Psychiatry in criminal investigation, punishment and trial.  
v. Describe the civil and criminal responsibilities of a mentally ill person.  
vi. Describe the role of Psychology in criminal investigation, punishment and trial

TEACHING SCHEDULE

The teaching schedule is as follows:

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Activity</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Seminar</td>
<td>Once a week</td>
</tr>
<tr>
<td>2.</td>
<td>Journal club</td>
<td>Once a week</td>
</tr>
<tr>
<td>3.</td>
<td>Tutorial/Case presentation</td>
<td>Once a week</td>
</tr>
<tr>
<td>4.</td>
<td>Microteaching</td>
<td>Once a week</td>
</tr>
<tr>
<td>5.</td>
<td>Dissertation work</td>
<td>Once every 6 months</td>
</tr>
</tbody>
</table>

- One CME & One Conference must be attended every year
**Rotation postings:** Other than the Department of Forensic Medicine, student will be posted for training in the following clinical disciplines for a given period of time on rotational basis:

<table>
<thead>
<tr>
<th>Place of posting</th>
<th>First year</th>
<th>Second year</th>
<th>Third year</th>
<th>Objectives</th>
</tr>
</thead>
</table>
| 01 Trauma & Emergency/Casualty / Emergency medicine department | 1 month    | 15 days     | 15 days    | • Medicolegal case management  
• Basics of poisoning emergencies |
| 02 Radiology                  | 7 days     | 5 days      | 3 days     | • Determine age estimation & medicolegal opinion findings on X-Rays, CT scan, MRI & USG |
| 03 Psychiatry                 | 5 days     | 3 days      | 2 days     | • Psychiatric evaluation in criminal cases/civil cases                      |
| 04 Forensic science laboratory | 7 days     | 15 days     | Not required | • Basics of DNA technology  
• Recent advances in FSL |
| 05 Pathology                  | 7 days     | 15 days     | 15 days    | • Basics of tissue processing and staining techniques  
• Reporting of autopsy based histopathology slides |
| 06 Recognised Institute of Government of India/ Government of Maharashtra | 7 days     |             |            | • Basics of techniques of analytical toxicology like HPLC, GC-MS, etc. |

**Dissertation:**

i. Every candidate shall carry out work on an assigned research protocol under the guidance of a recognized Postgraduate teacher, the protocol shall be written and submitted in the form of dissertation.

ii. Every candidate shall submit Dissertation plan in form of synopsis within the given time frame.
Process has to be completed within six months of admission to MD program.

<table>
<thead>
<tr>
<th>Activity</th>
<th>July session</th>
<th>January session</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selection of topic in consultation with PG guide</td>
<td>September/October</td>
<td>March/April</td>
</tr>
<tr>
<td>Institute Scientific Committee approval</td>
<td>November/December</td>
<td>May/June</td>
</tr>
<tr>
<td>Institute Ethics Committee approval</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final approval letter by Academic section</td>
<td>31st December</td>
<td>30th June</td>
</tr>
</tbody>
</table>

iii. Dissertation shall be submitted to the Academic section six months prior to commencement of theory examination i.e. by 31st December for June examination and by 30th June for December examination.

**ASSESSMENT**

a. **Continuous assessments**: Six monthly progress reports: Time schedule for six monthly progress reports will be as follows:

<table>
<thead>
<tr>
<th>Report</th>
<th>Period</th>
<th>Date of submission</th>
<th>Period</th>
<th>Date of submission</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>July to December</td>
<td>7th January</td>
<td>January to June</td>
<td>7th July</td>
</tr>
<tr>
<td>Second</td>
<td>January to June</td>
<td>7th July</td>
<td>July to December</td>
<td>7th January</td>
</tr>
<tr>
<td>Third</td>
<td>July to December</td>
<td>7th January</td>
<td>January to June</td>
<td>7th July</td>
</tr>
<tr>
<td>Fourth</td>
<td>January to June</td>
<td>7th July</td>
<td>July to December</td>
<td>7th January</td>
</tr>
<tr>
<td>Fifth</td>
<td>July to December</td>
<td>7th January</td>
<td>January to June</td>
<td>7th July</td>
</tr>
<tr>
<td>Sixth</td>
<td>January to June</td>
<td>10th June</td>
<td>July to December</td>
<td>10th December</td>
</tr>
</tbody>
</table>

Note- The first five reports will be taken into consideration to decide the eligibility of the student to appear for the professional examination.

b. **Logbook**: The performance of the postgraduate student during the training period will be monitored throughout the course and recorded in the logbook.

c. **Summative Assessment**:
   1. **Theory**:
      - There shall be four papers each of three hours duration. These are:

   **Paper 1**: Basic of Forensic Medicine, basic sciences and allied subjects.
   **Paper II**: Clinical Forensic Medicine and medical jurisprudence.
   **Paper III**: Forensic pathology and toxicology.
   **Paper IV**: Recent advances in Forensic Medicine, Forensic Psychiatry and Medical Toxicology, applied aspects of clinical disciplines and forensic sciences

2. **Practical Examination**:
   Practical examination would be spread over two days and should be as follows:

**Day 1**
   - **Clinical Cases** - (any 3) Age estimation, injury report, examination of an insane person to evaluate criminal/civil responsibility, examination of an intoxicated person, examination of a suspected case of poisoning (acute/chronic), disputed paternity case
and sexual offences (accused and victim).

- **Spots** - (10) Histopathology slides, photographs, exhibit material, X-rays, mounted specimens, bones, poisons and weapons, charts etc.

- **Toxicology Exercises** - (01) Identification and details of common poisons or chemical tests etc.

- **Laboratory Tests** - (01) Identification of biological stains (Semen, Blood, etc.), Histopathology slides of medico legal relevance, gram & acid fast staining etc.

**Day 2**

- Postmortem Examination.
- Thesis/Seminar Presentation - For assessment of research/teaching ability
- Discussion on a case for expert opinion
- Grand Viva Voce.

**Examination pattern & marks distribution**

**Formative**

A) **Theory**

<table>
<thead>
<tr>
<th>Schedule</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>At the end of First year</td>
<td>100 (1 paper)</td>
</tr>
<tr>
<td>At the end of Second year</td>
<td>100 (1 paper)</td>
</tr>
<tr>
<td>Pre-Professional examination</td>
<td>400 (4 papers of 100 marks each)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>600 marks</strong></td>
</tr>
</tbody>
</table>

B) **Practical**

<table>
<thead>
<tr>
<th>Schedule</th>
<th>Marks</th>
</tr>
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<tbody>
<tr>
<td>At the end of First year</td>
<td>100</td>
</tr>
<tr>
<td>At the end of Second year</td>
<td>100</td>
</tr>
<tr>
<td>Pre-Professional examination</td>
<td>400 (Practical 300 + Viva 100)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>600 marks</strong></td>
</tr>
</tbody>
</table>

Candidate should secure a minimum of 50 % marks in Theory and Practical separately, in order to be eligible to appear for Professional examination.

**Summative**

A  Theory  4 Papers each of 100 marks = 400 marks
B  Practical  Practical 300 + Viva 100 = 400 marks

**Final Result**

(A) Theory- 400 marks (Minimum 40 % marks in each paper and aggregate of 50 % in order to be declared pass)

(B) Practical- 400 marks

Minimum 50 % marks required in Theory & Practical separately, in order to be declared successful at MD/MS examination.
## Theory & Practical Examination pattern

| At the end of First year | Theory | 2 structured LAQs (25 x 2 = 50 marks)  
| | | 5 BAQ (10x5 = 50 marks)  
| | Practical | Spotting OSPE (20 marks)  
| | | Exercises: 4 exercises (10x4 = 40 marks).  
| | | Postmortem examination: 20 marks  
| | | Viva voce: (20 marks)  
| At the end of Second year | Theory | 2 structured LAQs (25 x 2 = 50 marks)  
| | | 5 BAQ (10x5 = 50 marks)  
| | Practical | Spotting OSPE (20 marks)  
| | | Exercises: 4 exercises (10x4 = 40 marks).  
| | | Postmortem examination: 20 marks  
| | | Viva voce: (20 marks)  
| Pre-professional exam | Theory (Paper I, II, III, IV each of 100 marks)  
| | Total = 400 marks | 2 structured LAQs (25 x 2 = 50 marks)  
| | | 5 BAQ (10x5 = 50 marks)  
| | Practical | Day 1 (200 marks)  
| | | • Clinical Cases - (3 x 50 = 150 marks) Age estimation, injury report/weapon examination, examination of an intoxicated person, sexual offences (accused and victim).  
| | | • Spots OSPE - (30 marks) Histopathology slides, photographs, X-rays, mounted specimens, bones, poisons, charts etc.  
| | | • Laboratory Tests - (20 marks) Identification of semen, blood, body fluids. Histopathology slides of medico legal relevance, gram and acid fast staining etc.  
| | Total = 400 marks | Day 2 (200 marks)  
| | | • Postmortem Examination. (60 marks)  
| | | • Thesis/Seminar Presentation - For assessment of research/teaching ability (20 marks)  
| | | • Discussion on a case for expert opinion (20 marks)  
| | | • Grand Viva Voce. (100 marks)  
| Professional exam | Theory (Paper I, II, III, IV each of 100 marks)  
| | Total = 400 marks | 2 structured LAQs (25 x 2 = 50 marks)  
| | | 5 BAQ (10x5 = 50 marks)  
| | Practical | Day 1 (200 marks)  
| | | • Clinical Cases - (3 x 50 = 150 marks) Age estimation, injury report/weapon examination, examination of an intoxicated person, sexual offences (accused and victim).  
| | | • Spots OSPE - (30 marks) Histopathology slides, photographs, X-rays, mounted specimens, bones, poisons, charts etc.  
| | | • Laboratory Tests - (20 marks) Identification of semen, blood, body fluids. Histopathology slides of medico legal relevance, gram and acid fast staining etc.  
| | Total = 400 marks | Day 2 (200 marks)  
| | | • Postmortem Examination. (60 marks)  
| | | • Thesis/Seminar Presentation - For assessment of research/teaching ability (20 marks)  
| | | • Discussion on a case for expert opinion (20 marks)  
| | | • Grand Viva Voce. (100 marks)  

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**M.D Curriculum**  
Forensic Medicine & Toxicology, AIIMS Nagpur  
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Recommended Textbooks:

1. Subramanyam BV. Modi’s Medical Jurisprudence and Toxicology. Butterworths India, New Delhi.
7. Camps FE. Gradwohl’s legal Medicine. Bristol: John Wright and Sons Ltd.

Reference books

3. Robertson J, Ross AM, Burgoyne LA. DNA in Forensic Science - Theory, Technique and Application. Ellis Horwood, UK
11. Gonzalez TA. Legal Medicine, Pathology and Toxicology- Appleton Century-Crofts Inc. New York.
25. Mehta HS. Medical, Law and Ethics in India. The Bombay Samachar Pvt. Ltd.
28. Redsicker DR. Forensic Photography, CRC Press USA.
34. Flanagan RJ et al. Basic Analytical Toxicology. Published by WHO, UNEP and ILO.
35. Guidelines for Poison Control. Published by WHO, UNEP and ILO

Journals

1. Forensic Science International
2. Journal of Forensic Sciences
3. Medicine, Science and Law
4. Journal of Forensic and Legal Medicine
5. American Journal of Forensic Medicine and Pathology
6. Journal of Indian Academy of Forensic Medicine
7. Journal of Clinical Forensic Medicine
8. Journal of Forensic Research