Amrita Vishwa Vidyapeetham University School of Medicine

Postgraduate Medical Education Programme

M.D. Degree in Forensic Medicine

Curriculum

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Amrita Vishwa Vidyapeetham University School of Medicine

Postgraduate Medical Education Programme

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Curriculum

Objectives

The main objective of the postgraduate training programme in Forensic Medicine is to produce specialist doctors who possess adequate knowledge, skills and attitude to handle all types medicolegal issues. The programme is also intended to make them excellent trainers for the undergraduate medical students.

At the end of the three year training programme the learner should be able to:

1. Conduct all types of medicolegal autopsies and furnish opinion as to the cause of death.
2. Conduct examination of human skeletal remains/tissues and furnish medicolegal opinion.
3. Conduct examination of all types of cases in clinical Forensic Medicine and furnish medicolegal reports.
4. Appear as expert witness in courts and tender evidence.
5. Assist and advice police in the examination of crime scenes, collection of trace evidence and scientific methods of criminal investigation.
6. Conduct basic laboratory investigations for the purpose collecting evidence from the living and dead.
7. Interpret laboratory results, and histopathological findings.
8. Update the knowledge in the modern trends and recent advances and Forensic Medicine and allied specialties.
9. Acquire knowledge in laws relating to medical practice and medical negligence.
10. Acquire knowledge in the forensic, clinical, emergency, environmental and medicolegal aspects of toxicology.
11. Plan, organise and manage clinical toxicological laboratory services in a hospital setting.
12. Provide information and consultation on all aspects of toxicology to medical professionals, industry, Government and public.
13. Acquire knowledge and basic skills in allied specialties like Forensic Radiology, Forensic Psychiatry, Forensic Odontology and Forensic Sciences.
14. Develop effective educational methodology in implementing the teaching / learning programme for the undergraduates.
15. Develop effective evaluation tools to assess the level of knowledge of undergraduates in the cognitive, psychomotor and affective domains.
16. Able to formulate the undergraduate curriculum in Forensic Medicine.
17. Plan, develop and manage medico legal centers in collegiate hospitals and District hospitals.
18. Aware of the limitations of his knowledge and seek help from appropriate sources.

**Curriculum Map**

- Duration of the postgraduate course shall be 3 years, organised into several units.
- The 1st year of the course should be mainly devoted to the study of Pathology, Microbiology, Biochemistry, Anatomy, Radiology, Odontology Pharmacology and Toxicology.
- Thesis work shall commence within 3 month of joining the subject.
- During the second year, apart from routine teaching/learning session in Forensic Pathology, training in Clinical Forensic Medicine is imparted by posting in the casualty service.
- During the third year, training in Forensic Sciences, Forensic Radiology, Forensic Odontology and Forensic Psychiatry should be given apart from practicing routine medicolegal work.
1st Year

1. **Orientation training** - 1 month

   Selection of topic for dissertation
   Preparation of the protocol
   Review of literature

2. **Pathology Department** - 3 months

   Clinical Pathology - procedures
   Histopathology - techniques
   Special staining techniques
   (During this phase, the learner should acquire knowledge in general and systemic pathology in relation to Forensic Medicine)

3. **Microbiology** - 1 month

   Routine microbiological investigations
   (During this phase learner should acquire knowledge in general microbiology and immunology and hypersensitivity reactions)

4. **Biochemistry** - 1 month

   Routine biochemical investigations
   Modern trends in laboratory methods

5. **Radiology** - 15 days

   Imaging techniques
   including X-rays
   CT Scan, MRI scans

6. **Odontology** - 15 days

   Forensic Odontology
   Bite mark identification
   Determination of age and identity

7. **Anatomy** - 1 month

   Forensic Osteology
Normal histology  
General anatomy  
Anatomy of neck  
Brain, Heart, Lungs  
Pelvic organs

8. **Pharmacology** - 1 month

Drug reaction  
Drug safety issues  
Drug trials

9. **Toxicology** - 1 month

Analytical toxicology  
Poison control work  
Chemical Examiners laboratory - analytical methods

10. **Forensic Sciences** - laboratory methods - 15 days

11. **Finger Printing** - Techniques - 1 week

12. **Special Armed Police** - 1 week

13. **Local Police Station**  
Inquest Procedure - 15 days

14. **Public Prosecutors Office**  
Criminal courts - 15 days

**2nd Year**

1. **Visit to Pioneer Institutions in Hyderabad**  
Central Forensic Science laboratory  
Chemical Examiners Laboratory - 1 month  
State Forensic Science laboratory  
Central Detective Training School

2. **Clinical Forensic Medicine**  
Casualty Service  
Medical Laboratory Service - 1 month  
Medical Records Keeping
3. **Forensic Psychiatry**  
   Forensic Anthropology - 1 month

4. **Forensic Pathology**  
   Thesis work - 9 months

### 3rd Year

1. **Pathology** - refresher course - 1 month
2. **Microbiology** - refresher course - 15 days
3. **Biochemistry** - refresher course - 15 days
4. **Toxicology** - refresher course - 1 day
5. **Radiology** - refresher course - 1 week
6. **Forensic Odontology** - refresher course - 1 week
7. **Toxicology** - refresher course - 1 week
8. **Thesis completion**  
   Forensic Pathology  
   Clinical Forensic Medicine  
   Examination of skeletal remains  
   Practical Sessions  
   Study of museum exhibits - 6 months
9. **Completion of thesis**  
   Revision of topics - 2 months
10. **University examination and declaration of results** - 1 month
Course Content

Anatomy

Anatomical nomenclature
Basic structure and function of cells
General Osteology
Head and neck - Surface anatomy
Skull and mandible
Face and Scalp
Neck, Pharynx, Larynx
Surface anatomy of thorax
Chest wall
Mediastinum
Heart and great vessels
Pleura, Lungs, trachea and bronchi
Surface anatomy of abdomen and pelvis
Gastrointestinal tract
Liver pancreas and spleen
Kidney, ureters
Suprarenals
Urinary bladder
Male and Female genitalia
Vertebral column and Spinal cord
Embalming / Anatomy Act

Physiology and Biochemistry

Basic knowledge of circulatory, respiratory, digestive and nervous system
Acid base balance
Hemopoietic systems
Fluid and electrolyte balance
Thermoregulation
Physiology of Sexual behavior
Reproductive physiology
Routine biochemical investigations

Pathology

Cell injury
Acute and chronic inflammation
Regeneration, wound healing
Hemodynamic disorders Thrombosis, Shock
Disease of immune system
Infectious diseases
Environmental diseases
Diseases of blood vessels
Heart
Lungs and respiratory passages
Kidney
Liver Pancreas & Spleen
Endocrines
Brain and Spinal cord
Histopathology - Techniques
Frozen Section - Technique
Special stains
Clinical Pathology procedures
Museum Techniques

Microbiology

Normal bacterial flora
Bacteriology of putrefaction
Microbiology of sexually transmitted diseases
Wound infection - aerobic and anaerobic bacteria
Immunology – hyper sensitivity
Food poisoning
Hospital infection
Microbiology of infections causing sudden death

Pharmacology

Pharmacological principles
Pharmacokinetics
Pharmaco dynamics
Adverse drug reactions
Drug Safety issues
Barbiturates
Tranquilizers
Narcotics
Psychotropic Substances
Anesthetics
Drug dependence
Biomedical Research
Good clinical Practice
Pharmaco vigilance

General Forensic Medicine

History of Forensic Medicine
Thanatology
Legal procedures
Inquest systems of the world
Forensic Pathology

Medico legal autopsy
Forensic taphonomy
Establishment of identity
Human skeletal examination
Asphyxial death
Mechanical injuries
Regional injuries
Vehicular accidents
Injuries due to fall
Medico legal aspects of injuries
Firearms and explosive injuries
Electrical injuries
Sudden natural death
Neonaticide and Infanticide
Transfusion reactions
Anaesthetic / maternal / operative death

Clinical Forensic Medicine

Wound certification
Drunkenness certification
Age determination
Examination of accused and victim of Sexual offence
Potency, virginity
Pregnancy, Delivery, abortion
Blood group system
Biological Stains

Medical Jurisprudence

Principles of medical ethics
Medical councils
Infamous conduct
Medical negligence
Euthanasia
Consent in medical practice
Doctor in consumer court
Doctor and torture
Human right violations

Toxicology
Forensic Toxicology – general principles
Human poisoning – general principles
Laws relating to poisons / drugs
Medico legal duties in poisoning
Toxico kinetics and toxico- dynamics
Toxic hazards of occupation, industry and environment
Chemico legal examination rules
Principles of analytical toxicology
Modern trends in analytical toxicology
Diagnosis and management of common poising due to
  Corrosives
  Nonmetallic substances
  Insecticides and weed killers
  Metallic substances
  Vegetable and organic irritants
  Somniferous compounds
  Inebriant substances
  Deliriant substances
  Food contamination/adulteration
  Substance causing spinal and cardiac toxicity
  Substances causing asphyxia (Asphyxiants)
  Household toxins
  Toxic envenomation
  Biological and chemical warfare

Forensic Sciences

  Scientific and investigative techniques – general principle
  Evaluation of crime scene
  Forensic Science Laboratory
  Blood stain patterns
  Biological fluids
  DNA analysis
  Trace evidence analysis
  Tool mark identification
  Fire and explosion investigation
  Reconstruction of vehicular accident

Allied Sciences

  Forensic Anthropology
  Forensic Odontology
  Forensic Radiology
  Forensic Psychiatry
  Forensic Ballistics
  Finger printing
  Photography
Cyber technology in crime investigation

**Law in relation to Medicine**

- Indian Medical Council Act.
- Consumer Protection Act
- Chemico legal examination rules
- Drugs and Cosmetics Act.
- Pharmacy Act 1948.
- Narcotic Drugs and Psychotropic Substances Act.
- Medical Termination of Pregnancy Act.
- Transplantation of Human Organs Act.
- Mental Health Act.
- Environmental Protection Act.
- Sexual Harassment of working women - Directions of Hon: Supreme Court.
- Trial of child sex Abuse or Rape - Directions of Hon: Supreme Court.
- Prohibition of sex Selection Act
- Assisted reproductive techniques - ICMR Guidelines.
- Ethical Guidelines for Biomedical Research on Human Subjects – Indian Council of Medical Research.
- Good clinical Practice - Central Drugs Standard Control Organisation - DGHS Govt of India.
- Guidelines for good clinical Practice - WHO.
- UN convention against torture and other cruel in human or degrading treatment.
- Istanbul Protocol - Manual on effective investigation and documentation of Torture.
- Indian Human Rights Act.

**Indian Penal Code**

- Chapter II General explanations
- Chapter III Punishments
- Chapter IV General exceptions
- Chapter XVI Offences affecting human body

**Code of Criminal Procedure**

- Chapter I Preliminary
- Chapter II Constitution of Criminal court and offices
- Chapter III Power of courts
- Chapter VI Process to compel appearance - Summons and
warrant

Chapter XII  Information to police and their power to investigate
Chapter XXV  Provisions as to accused persons of unsound mind

Indian Evidence Act

Chapter I  Preliminary
Chapter II  Opinions of third persons when relevant
Chapter X   Examination of witnesses

M.D Degree Examination

Theory  -  Four papers
        - Each 3-hour duration
        - 400 marks

Paper I - 100 Marks  -  Basic Sciences like Anatomy,
                          Physiology, Biochemistry,
                          Pharmacology, Pathology, and
                          Microbiology in relation to Forensic
                          Medicine

Paper II - 100 Marks  -  Forensic Pathology

Paper III - 100 Marks  -  Clinical Forensic Medicine
                          Medical Jurisprudence

Paper IV - 100 Marks  -  Forensic Toxicology
                          Forensic Sciences
                          Forensic Psychiatry
                          Forensic Radiology
                          Forensic Odontology
                          Forensic Anthropology

Practical - 200 Marks

Day I  -  Autopsy
       - Gross Specimens
       - Histopathology Slides
       - Photographs / X Rays
       - Skeleton examination
       - Toxicology Spotters
       - Weapons / ammunition

Day II  -  Examination of insane person
        - Determination of age
        - Drunkenness Certification
Examination of injuries
Accused / Victim of Sexual offences
Fetal autopsy
Expert opinion on medico- legal
Cases Microteaching session

Thesis evaluation & Grand Viva Voce - 100 Marks

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Part I - Applied basic Sciences

(Anatomy, Physiology, Biochemistry, Pharmacology, Pathology and Microbiology)

Time 3 Hours

Maximum - 100 Marks

I Describe the blood supply to the heart. Enumerate the types of occlusion that can occur in the coronary arteries. How will you demonstrate myocardial infarction during autopsy? (20)

II Enumerate the immune mechanisms of tissue injury. Describe the morbid anatomical findings in a case of anaphylactic death following an intramuscular injection of Procaine Penicillin. (20)

III Write Short notes: (60)

1. Sudden death due to drug interaction
2. Phases of drug trial
3. Metabolic acidosis
4. Gastric emptying
5. Frozen section technique
6. Berry aneurysms of the circle of Willis
7. Opium derivatives
8. Embalming
9. Pulmonary thromboembolism
10. Anaerobic infection in injuries
11. Traumatic myocarditis
12. Cardiomyopathy

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Part II - Forensic Pathology

Time 3 Hours Maximum - 100 Marks

I  Describe the pathophysiology of burns. How will you ascertain the cause and manner of death in the case of an extensively charred dead body recovered from a burnt hut?  

II  A dead body of a 35 years old male was found in a deep lake with a faint ligature mark around the neck and a suicide note in his shirt pocket. What are the medico legal investigations to be conducted to establish the cause, time and manner of death?  

III  Write Short notes:  

1. Diffuse axonal injuries  
2. Injury triad  
3. Psychogenic causes of erectile dysfunction  
4. Holiday heart syndrome  
5. Complications of criminal abortion  
6. Trauma and tumour  
7. Disseminated intravascular coagulation
8. Lightning injuries
9. Transfusion reaction
10. Temporary cavitation
11. Dismemberment
12. Psychological autopsy

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Part III- Clinical Forensic Medicine

Time 3 Hours Maximum - 100 Marks

I. An offender tresspassed into the house of a 40 year old widow staying alone, assaulted and raped her. She was brought to you immediately after the occurrence. What are the medico legal investigations you will conduct to connect the crime with the offender?

II. A person was brought to the causally in an unconscious state with miosis. How will you diagnose the condition? What are your medico legal duties?

III. Write short notes:

1. Delirium tremens
2. Cardiotoxins
3. Service as defined in the Consumer Protection Act
4. Peritoneal dialysis
5. Cynogenic plants
6. Red tide
I. You are called to a scene of crime where a person is found dead in a pool of blood. How will you proceed to examine the body and the scene? What are the inferences that could be drawn from the spatter patterns of blood? (20)

II. The modern techniques of DNA typing? What are the advantages of mitochondrial DNA analysis? Comment on the acceptability of DNA evidence in the courts of law. (20)

III. Write Short notes: (60)

1. Methods of restraint of a mentally ill person
2. Virtopsy
3. Carabellis cusp
4. 3D reconstruction of face
5. Gustaffsons Technique
6. Brain finger printing
7. Prostate specific antigen
8. Chemiluminescence test
9. Colposcopy
10. High Performance Liquid Chromatography
11. Radio-active carbon estimation
12. Forensic Art

### M.D. Degree Course in Forensic Medicine
#### Recommended Reading

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<thead>
<tr>
<th>No.</th>
<th>Name of Book</th>
<th>Author</th>
<th>Edition</th>
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<tbody>
<tr>
<td>1</td>
<td>Taylor’s Principles and Practice</td>
<td>Keith Mant(Ed.)Churchill</td>
<td>13&lt;sup&gt;th&lt;/sup&gt;</td>
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<tr>
<td>2</td>
<td>H.W.V. Cox Medical Jurisprudence and Toxicology</td>
<td>Bernard Knights (Ed.)</td>
<td>6&lt;sup&gt;th&lt;/sup&gt;</td>
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<td>3</td>
<td>Ratan Lal and Dhiraj Lal’s Indian Penal Code</td>
<td>Ratan Lal</td>
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<td>4</td>
<td>Ratan Lal and Dhiraj Lal’s Criminal Procedure</td>
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<td>5</td>
<td>Drugs and Cosmetics Act 1940 with State Amendments and short notes</td>
<td>Eastern Book Co.</td>
<td>12&lt;sup&gt;th&lt;/sup&gt;</td>
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<tr>
<td>6</td>
<td>Davidson’s Principles and Practice of Medicine</td>
<td>C.R.W. Edwards</td>
<td>17&lt;sup&gt;th&lt;/sup&gt;</td>
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<td>7</td>
<td>Clinical Forensic Medicine</td>
<td>Ed. WDS Mclay</td>
<td>II</td>
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<td>8</td>
<td>A physician’s guide to clinical Forensic Medicine</td>
<td>Margret M. Stark</td>
<td>I</td>
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<td>9</td>
<td>Forensic Science handbook- Vol III</td>
<td>Richard</td>
<td>I</td>
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<td>10</td>
<td>Injury causation analysis- Vol III</td>
<td>Arthur C. Damask</td>
<td>I</td>
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<td>11</td>
<td>Manual of Forensic Odontology</td>
<td>Michael Bowers</td>
<td>III</td>
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</table>
12. Psychiatry & Criminal culpability
   Ralph Slovenko

13. Health care professional as
   witness to the court
   C. J. Holburn

14. Forensic pathology in criminal cases
   Michael A. Graham

15. Guide to Forensic Pathology
   Jay Dix

16. Reference manual on scientific evidence
   Mathew Bender

17. Spitz & Fisher’s medico legal investigation of death
   Werner U. Spitz

18. The estimation of the time since death in the early P M period
   Clans Hessage

19. Principles of Forensic Medicine
   Stephen P. Robinson

20. Forensic pathology in criminal cases
   Michael A. Graham

21. Forensic art & illustration
   Karen T. Taylor

22. Forensic Science- An introduction to scientific & investigative techniques
   Stuart H. James

23. Forensic Radiology
   Brogdon B. G

24. Forensic medicine clinical & pathological aspects
   Jayson Payne James

25. Advances in Forensic Taphonomy
   William D. Haglund

26. Forensic psychiatry for health professionals
   Chris Llyod

27. Practical aspects of rape investigation
   Robert R. Hazlewood

28. Simpson’s Forensic Medicine
   Richard Shepherd

29. Colour Atlas of Forensic Pathology
   Jay Dix

30. Motor vehicles act
   Parameswaram Moothath

31. Encyclopedia of Forensic Sciences
   Jay A Siegel

32. Simpson’s Forensic Medicine
   Bernard Knight

33. Parikh’s Text book of Medical

34. Medical Jurisprudence & Toxicology.
   C.K. Parikh.

35. The Essentials of Forensic Medicine and Toxicology.
   K.S.N. Reddy.

36. Modern Medical Toxicology.
   V.V. Pillay.

37. Diagnosis and Management of Common Poisoning.
   P. Aggarwal, J.P. Wali

38. Medical Jurisprudence and Toxicology
   B.V. Subrahmanyam.

   A. Nandy.

40. Medical Toxicology.
   M.J. Ellenhorn.

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88. Medical Toxicology
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91. Encyclopedia of Forensic Sciences
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96. Simpson’s Forensic Medicine
   Bernard Knight

97. Encyclopedia of Forensic Sciences
   Jay A Siegel

98. Medical Jurisprudence and Toxicology
   B.V. Subrahmanyam.

99. Principles of Forensic Medicine
   A. Nandy.

100. Medical Toxicology
    M.J. Ellenhorn.

101. Sene Investigations
    Dr. O.P Murthy
42. The Indian Penal Code                  Retanlal and Dhirajlal  25th
43. Acute Poisoning                      A.T Proudfoot       2nd
    Diagnosis & Management
44. Interpreting DNA Evidence           Ian W. Evett
    and Statistical Genetics for
    Forensic Scientists     Bruce S Weir
45. Forensic DNA Typing                  John M. Butler
46. Principles of Forensic Medicine      Apurba Nandy     1st
47. Pathology -Volume I                  Anderson        16th
48. Text book of Medicine               Vasan & Sudha Seshadri 1st
49. Pathology of Trauma                 Mason             1st
50. Forensic pathology                  Bernard Knight     1st
51. Forensic pathology-Volume II         Bernard Knight     1st
52. Text book of Medicine               Vasan & Sudha Seshadri 1st
53. Pathology of Trauma                 Mason             1st
54. Forensic pathology                  Bernard Knight     1st
55. The Constitutional Law of India     Pandey            19th
56. The Code of Criminal Procedure      Ratanlal           13th
57. Modern synopsis of Psychiatry       Freedman          1Ind
58. Subramanyam By Modi’s Media Jurisprudence and Toxicology. Butterwoths India, New Delhi
60. Lyon’s Medical Jurisprudence for India. Delhi Law house
62. Parikh Ck Parikhs text book of Medical Jurisprudence, Forensic medicine & Toxicology, CBS
    Publishers and Distributers London.
63. Bernard Knight. forensic Pathology, Arnold Publishers London
64. Di Maio VJ & Di Maio D. Forensic Pathology. CRC Press New York.
    New York.

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