

## **Diploma course in Forensic Medical Sciences**

### **SYLLABUS**

The course will cover the areas shown in the syllabus for the DipFMS which is specified below. Students will be expected to have a theoretical knowledge of the basic facts and principles of all forms of medico-legal enquiry and the reason for the form of that enquiry. Topics to be covered include:

#### **SECTION A**

#### **PRINCIPLES OF MEDICINE AND THE MEDICO-LEGAL AUTOPSY**

##### **1. Human anatomy and physiology**

Knowledge of the structure and workings of the human body sufficient to understand medical evidence:

- Medical terminology, medico-legal reports
- Nature of cells, tissues, organs
- Body structure – skeleton, tissue layers, body cavities
- Body systems – component parts and functions
- detailed structure and function of cardiovascular, respiratory, haemopoetic, nervous and gastro-intestinal systems

##### **2. Medical aspects of death**

Understanding the nature and definition of death:

- cellular and somatic death
- concept of brain death; persistent vegetative state
- transplantation procedures

##### **3. Physical changes after death**

What happens to the body physically after death and what use can be made of this:

- general principles, relevance in determining time of death, and factors affecting
- temperature drop
- lividity
- rigor mortis
- decomposition and variants

##### **4. Natural disease as a cause of death**

Natural disease relevant to forensic practice – causes of sudden death:

- ischaemic heart disease – atheroma, myocardial infarction; relevance in assault deaths
- cardiomyopathy and inherited cardiac conditions
- hypertension, aneurysms
- pulmonary thromboembolism and deep venous thrombosis
- pneumonia, asthma, asbestos related disease
- cerebrovascular disease, subarachnoid haemorrhage, meningitis

- gastro-intestinal haemorrhage, peritonitis, pancreatitis
- septicaemia, MRSA, Cl difficile

## **SECTION B**

### **LEGAL PROCEDURES RELATING TO DEATHS AND THEIR INVESTIGATION**

#### **5. Legal aspects of death**

Knowledge of the necessary legal procedures after someone's death:

- legal responsibilities of the medical practitioner
- death certificates and procedure
- cremation certificates and procedure
- referring deaths to the Procurator Fiscal or Coroner
- weaknesses in the system and proposed reforms
- Human Tissue Act / Human Tissue (Scotland) Act and tissue retention

#### **6. Procurator Fiscal and sudden deaths**

Role of the Procurator Fiscal in the investigation of deaths in Scotland

- position of the Procurator Fiscal in the Scottish legal system and comparison with rest of UK
- legal responsibility in the investigation of deaths
- deaths reportable to Procurator Fiscal and process of investigation; involvement of police
- post mortem examinations; additional investigations and enquiries
- subsequent decisions and disposal
- Fatal Accident Inquiries; criminal proceedings

#### **7. HM Coroner and sudden deaths**

Role of the Coroner in the investigation of deaths in England, Wales and Northern Ireland

- position of the Coroner in England, Wales and Northern Ireland, and comparison with Scotland
- legal responsibility in the investigation of deaths
- deaths reportable to the Coroner and process of investigation; involvement of police
- post mortem examinations; additional investigations and enquiries
- subsequent decisions and disposal
- Inquests; referral for criminal proceedings

## **SECTION C**

### **INJURY INTERPRETATION**

#### **8. Injury classification and causes**

The nature of injuries and how they are produced, described and interpreted:

- occurrence of injuries in clinical and post mortem practice; limits of interpretation
- concept of blunt and sharp force trauma
- abrasions, bruises, lacerations
- incised wounds, stab wounds

- internal damage, issues of survivability
- injury patterns – accident, suicide or homicide

## 9. Major trauma

Clinical and pathological aspects of major trauma:

- transportation accidents and injury patterns
- accidents at work
- injury scores; Glasgow Coma Scale
- resuscitation techniques, transfusion, ventilation

## 10. Firearms and firearm injuries

Knowledge of the common types of guns, how they work, and the injuries they produce:

- classification of weapons and ammunition, circumstances of use, legal controls
- principles of how firearms produce injuries
- air weapons
- shotguns
- rifled weapons – revolvers, pistols, rifles
- automatic weapons, military small arms
- post mortem examination in firearms cases and injury interpretation
- role of radiology; recovery of evidence
- work of firearms units, test firing, matching of weapons

## 11. Head injuries

Understanding the mechanisms of head injuries, their clinical effects and the pathological findings:

- circumstances of head injuries – road traffic accidents, falls, assaults
- clinical presentation and outcome – concussion, coma, long term disabilities
- rationale for treatment – raised intracranial pressure, cerebral oedema, surgical intervention
- external injuries and interpretation
- skull fractures – linear, comminuted, depressed
- intracranial bleeding – extradural, subdural, subarachnoid and intracerebral haemorrhage
- brain injury – focal and diffuse

## SECTION D OTHER MECHANISMS OF INJURY AND DEATH

### 12. Asphyxia

Nature of asphyxia and its causes:

- definition of asphyxia and physiological mechanisms involved
- signs of asphyxia – petechial haemorrhages, cyanosis, congestion
- specific causes and relevance in forensic practice
- crush asphyxia
- suffocation – accidental, suicidal, homicidal; relevance in infant deaths
- compression of the neck – manual and ligature strangulation; reflex cardiac arrest; time-scale
- hanging

### **13. Drowning**

Circumstances of drowning and the findings at post mortem:

- issues of 'bodies in water' and circumstances of drowning – accident, suicide, homicide
- physiological mechanisms involved
- aim of post mortem examination and typical findings – immersion v drowning
- problem cases – decomposition, injuries
- additional investigations – identification procedures, diatom studies

### **14. Hypothermia**

Nature of hypothermia and its causes:

- definition and physiological mechanisms
- common circumstances – role of exposure, alcohol, injuries, natural disease, mental illness
- post mortem findings and diagnostic difficulties
- suspicious presentations

### **15. Fires, burns and carbon monoxide poisoning**

Understanding the physics and circumstances of fires, and how they cause death:

- fire triangle, classification of types of fire
- incidence and common circumstances; role of alcohol
- fire investigation – establishing seat of fire, nature of damage caused, use of accelerants
- cause of death in fires – smoke inhalation, burning, trauma
- aim of post mortem examination and typical findings; establishing cause of death
- toxicology investigations – carbon monoxide, cyanide, alcohol
- issues over 'bodies in fire' – identification, concealed homicide
- burns - causes, methods of classification and principles of treatment
- carbon monoxide poisoning – toxic effects and sources other than house fires

### **16. Explosions**

Understanding the nature of explosions and explosive devices, and their effects:

- causes of explosions – mechanical, gaseous, chemical
- gas explosions – gases involved, required conditions, effects
- explosive devices – nature and variety, use, fragmentation v blast
- lethal effects – blast injury, injuries from fragments, crushing, fires
- investigation of explosions

### **17. Child deaths and abuse**

Causes of unexpected death in children, natural and otherwise

- sudden unexpected death in infancy – natural, SIDS, accidental, homicidal
- the paediatric post mortem examination
- SIDS – typical features, possible causes
- asphyxial deaths – overlaying, imposed airways obstruction; post mortem evidence
- child abuse – physical, sexual, neglect, emotional; parental characteristics and behaviour
- physical abuse – typical injuries – external, fractures, internal
- 'shaken infant syndrome'
- neonaticide

## **18. Deaths in custody**

Deaths occurring in police and prison custody and how they are investigated:

- definitions of custody, numbers of deaths and how categorised
- in police custody - alcohol/drug related, suicide, injury, natural, restraint
- others – RTA, shooting, other contact
- how investigated; role of IPCC in England and Wales
- prison deaths
- legal investigations – Fatal Accident Inquiry, Coroner’s Inquest, criminal prosecution

## **19. Alcohol abuse**

Alcohol related deaths and their frequency in forensic practice

- scale of alcohol abuse, social issues, morbidity and mortality
- deaths from acute intoxication – interpretation of alcohol levels
- trauma while intoxicated – falls, road traffic, fires, drowning, homicide etc.
- deaths and illness from chronic alcohol abuse – liver disease, pneumonia, epilepsy

## **20. Drug related deaths**

Deaths from opiates, stimulants and other abused substances

- post mortem examination in drug related deaths, typical findings, health and safety issues
- sample collection, further investigations, interpretation of toxicology results
- cause of death – general principles, specific effects of individual drugs, contributing factors
- causes of death other than intoxication

## **SECTION E**

### **CLINICAL FORENSIC MEDICINE**

## **21. Confidentiality of medical information, consent and negligence**

Appreciation of the legal and ethical aspects of medical practice and how they are regulated

- confidentiality of medical information – principles, circumstances of disclosure, public interest
- consent to medical treatment – nature of consent, when required, who can give, competency
- medical negligence – definition and legal requirements, duty of care, legal process
- General Medical Council – composition, structure and functions; Good Medical Practice
- responsibility for registration, medical education, medical advice and fitness to practice
- medical defence organisations

## **22. Sexual offences**

Nature of sexual offences and their medical and scientific investigation

- legal definition of rape and differences between jurisdictions in UK
- circumstances and typical characteristics of sexual assaults and the victims
- role of the forensic physician / specialist teams in examination of victims; consent issues
- clinical examination procedure; evidential samples taken; further roles
- drug facilitated offences
- conclusions from examination; prosecution of cases through courts
- other sexual offences

### **23. Examination of detained persons**

Duties of the forensic physician in examining and caring for those in police custody

- clinical and legal responsibilities; consent and disclosure issues
- reasons for examination – assessing fitness for custody, fitness for interview
- examination of injuries, obtaining evidential samples
- drug dependent detainees – examining and prescribing
- forensic examinations – procedures, intimate searches
- preparation of reports, presentation of evidence

### **24. Forensic psychiatry**

Forensic aspects of mental illness and the role of the forensic psychiatrist

- classification of mental disorders relevant to criminal legal system
- psychoses – schizophrenia, affective disorders
- neuroses – anxiety, phobias, post traumatic stress
- personality disorder – psychopathic behaviour
- organic disorders, learning disabilities, drug misuse
- compulsory treatment orders and regulations
- psychiatric assessment – fitness to plead, insanity, diminished responsibility; subsequent disposal

## **SECTION F FORENSIC SCIENCE AND TOXICOLOGY**

### **25. Forensic science in crime investigation**

The contribution of forensic science in the investigation of crime:

- the development of forensic science and current expertise
- crime scene investigation and the role of the Crime Scene Manager
- Locard's principle, trace evidence recovery, interpretation of findings
- main divisions in scientific work – biology, chemistry, toxicology
- hairs and fibres, glass and paint analysis, marks and impressions, documents
- firearms, fire investigation, blood pattern analysis, DNA profiling

### **26. DNA technology**

Understanding DNA technology and its contribution to the investigation of crime

- basis of DNA profiling and its historical development; DNA database
- cell structure – chromosomes, DNA sequences, genetic code
- polymerase chain reaction (PCR), short tandem repeats (STR), mitochondrial DNA
- samples analysed, methodology, analytical issues
- presentation of DNA evidence in court

## **27. Forensic toxicology**

Role of the forensic toxicologist

- clinical and post mortem toxicology
- nature of drugs and poisons; medicines legislation – Poisons Act, Medicines Act
- overdose of prescribed medication; adverse drug reactions
- samples analysed and equipment used – blood, urine, hair, saliva
- problems in interpretation; presentation of evidence

## **28. Alcohol and alcohol related offences**

Chemistry and physiological effects of alcohol and the basis of road traffic legislation

- chemistry of alcohol and nature of alcoholic drinks
- absorption, breakdown and excretion of alcohol in the body, and factors affecting:
  - measurement of alcohol levels – blood, urine, breath
  - road traffic offences

## **29. Drugs of abuse**

Categories and effects of abused drugs and the legislation controlling them

- definition of an abused drug; abuse statistics
- drug legislation and penalties – Misuse of Drugs Act
- opiates – heroin, methadone; benzodiazepines
- stimulants – cocaine, amphetamines, ecstasy
- hallucinogens; volatile substances
- ‘new’ drugs
- drugs and driving; drugs in sport

## **SECTION G**

### **OTHER FORENSIC SPECIALITIES**

## **30. Forensic odontology**

**Role of dentistry in forensic work**

- use in identification and in examination of bite marks
- identification – single body / mass fatalities; ante mortem and post mortem data; role of radiology
- systems of dental charting; age estimation; DNA analysis
- bite marks – recognition, recording, interpreting, comparison with suspect
- possible conclusions, presentation of evidence in court

## **31. Forensic archaeology, anthropology, botany and entomology**

Other scientific specialities that may be involved in crime investigation

- forensic archaeology – location of buried bodies; techniques used, soil analysis
- forensic anthropology – examination of the skeleton – identification, disease, trauma
- forensic botany – examination of vegetation, pollen, stomach contents
- forensic entomology – flies, maggots

### **32. Forensic expertise in an international setting**

Appreciating the contribution of forensic specialists in major disasters and war crimes investigations

- using forensic expertise in victim identification and documentation of injuries
- concept of war crimes, development of international law and forensic involvement
- specific applications of forensic archaeology, anthropology and pathology
- presentation of evidence; international courts

## **SECTION H**

### **THE LAW AS IT RELATES TO FORENSIC PRACTICE**

### **33. Legal systems of the United Kingdom**

Understanding the sources and structures of the law of the UK, the differences between jurisdictions, the personnel involved, and the structure of the courts

- civil versus criminal; adversarial versus inquisitorial
- different legal systems in UK
- legal personnel – solicitors, magistrates, advocates/barristers, sheriffs, judges

### **34. Prosecution of crime in the rest of the United Kingdom(except Scotland)**

How crime is investigated and prosecuted in England, Wales and Northern Ireland

- Crown Prosecution Service; relationship with the police
- criminal court structure in England and Wales – magistrate and crown courts
- Police and Criminal Evidence Act
- initial procedures, court appearance, time limits
- preparation of case for prosecution
- conduct of trial – opening speech, witness evidence

### **35. Prosecution of crime in Scotland**

How crime in Scotland is investigated and prosecuted through the courts

- structure and responsibilities of the Crown Office and Procurator Fiscal Service; the Law Officers
- criminal court structure in Scotland – district, sheriff and high courts; jurisdiction and powers
- role of the Procurator Fiscal in a criminal investigation; relationship with the Police
- initial procedures, court appearance, committal, time limits
- decisions on trial – summary or solemn; level of court; indictment; citation of witnesses
- preparation of case for trial – reports, witness statements, precognition
- conduct of trial – type of witnesses, presentation of evidence, cross examination



### **36. Role of the defence in criminal prosecutions**

The role of an accused person's defence team in a criminal prosecution

- rights of the accused person and access to legal assistance
- role of defence primarily to test the prosecution case and the evidence submitted
- defences of diminished responsibility, provocation, alibi, self-defence, incrimination, insanity
- disclosure of prosecution reports and statements
- commissioning of own investigations and experts; limitations of examinations

### **37. Expert witnesses and the presentation of scientific evidence**

The role and responsibilities of the expert witness

- distinction from other witnesses; opinion evidence; who decides
- qualifications – registration; Frye and Daubert tests
- responsibilities – independent, unbiased, expertise, clarity, disclosure
- position in other countries