



Institute of Botany
Faculty of Life Sciences
University of the Punjab, Lahore
Course Outline
Semester – VII



Programme	BS	Course Code	Bot- 404	Credit Hours	2
Course Title	Forensic Botany (Theory)				
Introduction					
The course aims to introduce students to the principles and practices of Forensic Botany, exploring various techniques to analyze botanical evidences and implementation in legal cases.					
Learning Outcomes					
By the end of this course, students will be able to: <ul style="list-style-type: none">• Understand how plant can be used in Forensic investigations.• Describe methods for analyzing plant-based evidence.• Explain the role of plant materials in Forensic Science.					
Course Contents					
<ul style="list-style-type: none">• Plants as trace/transfer evidence• Plants in our society• Plants as poisons• Use of plants as food, fiber, medicine• Recreation• Law enforcement <p>Forensic Botany</p> <ul style="list-style-type: none">• Introduction to forensic botany• Civil vs Criminal forensic botany <p>Use of Botanical evidence in criminal investigation</p> <ul style="list-style-type: none">• Use of botanical evidence in criminal investigation• Botanical evidence and crime scene; source, transfer, evidence recognition, collection, preservation and documentation of botanical evidences in criminal investigation <p>Role of Various Disciplines of Botany in Forensic investigation</p> <ul style="list-style-type: none">• Limnology, Plant Ecology, Plant Entomology, Palynology, Plant Mycology, Plant Anatomy &• Taxonomy & Plant Molecular Biology <p>Forensic Limnology & its application</p> <ul style="list-style-type: none">• What is forensic limnology?• Aquatic plants (e.g., algae, diatoms) have been useful;• To link suspects to a crime scene• To establish that drowning occurred in freshwater• Can be used for identification purposes• A case study: In 1991, two young boys were brutally attacked by teenage assailants while fishing at a suburban pond in Connecticut or similar cases <p>Forensic Ecology & its application</p>					

- What is forensic ecology?
- Role of forensic ecology in criminal cases
- Plant ecology (growth patterns of vegetation) useful in estimating time of death
- A case study:

Forensic Palynology, history and application

- What is palynology and forensic palynology?
- History of forensic palynology
- Utilization of forensic palynology
- Situations in which palynology can assist an investigation
- Pollen and spores: what, where and why?
- Pollen analysis; How it works
- Sample preparation for pollen analysis
- Interpreting forensic pollen assemblages
- Significance of the pollen evidence at crime scene
- Forensic pollen samples
- Soil, dirt, and dust, fibers from rope, carpets, fur, animal and human hair
- Pollen sample collection, storage and packing materials
- Future of forensic palynology
- A case study: Famous case that exemplifies the use of pollen in criminal casework is described by Horrocks et al. in Auckland, New Zealand or similar cases

Forensic Mycology

- Forensic mycology: definition and fields of applicability
- Fungi and thano-chronology: case studies
- Methods of sampling fungi at a crime scene (outdoor or indoor) environment
- Fungal spores are important micro-traces since, like other palynomorphs
- Forensic mycology use to relate the scene to the defendant by analyzing fungal biota at the crime scene
- A Case Study: Determination of postmortem intervals from mold growth on corpses or similar cases

Forensic Anatomy & its application

- What is forensic anatomy?
- Role of forensic anatomy in criminal cases
- Plant anatomy as leaf morphology and tree growth ring patterns to aid in;
- Species identification
- Performing physical matches of evidence
- A case study: First modern-era case to use such botanical evidence in court; kidnapping and death of Charles Lindbergh's young son in 1932 or similar cases

Forensic Molecular Biology & its application

- What is forensic molecular biology?
- Role of DNA fingerprinting in criminal cases (murder, rapists in rape, parents in case of doubtful parentage) and civil cases (immigration, disputes involving purebred dogs, and in animal conservation studies)
- A case study: first criminal case with legal acceptance using plant DNA typing was a homicide that occurred in 1992 in Arizona's Maricopa County or similar cases
- DNA analysis/DNA profiling/ typing/Fingerprinting
- Applications of DNA fingerprinting in forensic botany
- Detection of genetically modified organisms (GMOs)
- Phylogenetic relationship
- Utilization of molecular methods to analyze botanical trace evidence

Programme	BS	Course Code	Bot-406	Credit Hours	1
Course Title	Forensic Botany (Lab)				
Lab Course Contents					
<ul style="list-style-type: none"> • Identification of various Plant parts (macro and microfragments) in the laboratory through various techniques (hand lens, light microscopy etc.) • Identification of different Fabric(s) by various means • Recovery of Plant Debris including palynomorphs (e.g. pollen and spores) from fabrics, leather and other items such as ornaments, jewelry etc. • Coprolite analysis for Forensic use • Gut analysis to isolate Plant particles • Extraction and Identification of Phytobodies from different relevant Body parts, using established forensic protocols 					
Textbooks and Reading Material					
<ol style="list-style-type: none"> 1. Coyle, H. M. (2004). <i>Forensic botany: principles and applications to criminal casework</i>. crc press. 2. Bock, J. H., & Norris, D. O. (2015). <i>Forensic plant science</i>. Academic Press. 3. Hall, D. W., & Byrd, J. (2012). <i>Forensic botany: a practical guide</i>. John Wiley & Sons. 4. Gibson, D. J. (2022). <i>Planting Clues: How plants solve crimes</i>. Oxford University Press. 5. Margiotta, G., Bacaro, G., Carnevali, E., Severini, S., Bacci, M., & Gabbriellini, M. (2015). Forensic botany as a useful tool in the crime scene: Report of a case. <i>Journal of forensic and legal medicine</i>, 34, 24-28. 6. Kasprzyk, I. (2023). Forensic botany: who?, how?, where?, when? <i>Science & Justice</i> 63 (2023) 258–275 7. Thotakura, Dr & Shivudu, G.. (2015). <i>Forensic Botany: An investigative science</i>. 8. Editor(s): Prof. Francis Proctor and Lou Czarnecki (2015) <i>Forensic Botany</i>, Delve Publishing LLC 9. Uitdehaag, S., Dragutinovic, A., & Kuiper, I. (2010). Extraction of diatoms from (cotton) clothing for forensic comparisons. <i>Forensic science international</i>, 200(1-3), 112-116. 10. Mildenhall, D. C., Wiltshire, P. E., & Bryant, V. M. (2006). Forensic palynology: why do it and how it works. <i>Forensic science international</i>, 163(3), 163-172. 11. Hu, S., Liu, C., Wen, J., Dai, W., Wang, S., Su, H., & Zhao, J. (2013). Detection of diatoms in water and tissues by combination of microwave digestion, vacuum filtration and scanning electron microscopy. <i>Forensic Science International</i>, 226(1-3), e48-e51. 12. Eliet, J. R., & Harbison, S. A. (2006, April). The development of a DNA analysis system for pollen. In <i>International Congress Series</i> (Vol. 1288, pp. 825-827). Elsevier. 13. Mildenhall, Dallas & Bryant, Vaughn & Milne, Lynne. (2004). <i>Forensic Palynology</i>. 10.1201/9780203484593.ch14. 14. V.M. Bryant, (2014). "Pollen and Spore Evidence in Forensics" in <i>Wiley Encyclopedia of Forensic Science</i> (2nd edition), eds A. Jamieson and A.A. Moenssens, John Wiley: Chichester. Published 14th March 2014. 					
Teaching Learning Strategies					
<ul style="list-style-type: none"> • Lectures • Laboratory work <p style="text-align: right;"> Group Discussion Seminar/ Workshop </p>					
Assignments: Types and Number with Calendar					
<ul style="list-style-type: none"> • Lecture Based Examination (Objective and Subjective) • Assignments • Quiz <p style="text-align: right;"> Class discussion Tests </p>					
