

**Introduction to the course:**

The course gives the students an introduction to the fossil record of land plants and algae, their evolution, biology, and morphology. The primary goal is to explain the science of Archaeopalynology, to outline the main features of pollen and to show how these properties are used in various branches of science.

**Course Objectives:**

The aim of the course is:

1. To understand the structure pollen and spores.
2. To raise a level of identification for pollen analysis
3. To provide students with the practical skills to analyze pollen/spores and plant remains with microscopic techniques and the statistical modelling for the reconstruction of the palaeoenvironment and palaeoclimate.

**Course Detail:**

1. **Archaeopalynology:** Definition, Pollen Structure, Exine Stratification, Sporopollenin.
2. **Pollen Production:** Dispersal and deposition by Air (Anemophily), Water (Hydrophily), Animals (Zoophily) and other Agencies, Re-deposition and Recycling.
3. **The Archaeological Deposits:** Classification and Description (Allochthonous, Autochthonous, Regenerative Peat).
4. **Pollen as indicators of vegetation:** Flora, history of Climate, Domestication of Plants, the Human Impact, Cultivation Practices through ages; Cultural Landscape Development, examples from Indus Valley Civilization and other parts of the world.
5. **Pollen Analysis** for dating, Recent Pollen as Markers.
6. **Coprolite Palynology** to deduce human dietary habits, the climate and cooking abilities.
7. **Pollen Diagrams and Maps**

**Practicals:**

1. Various Pollen and Spores extraction techniques from soil samples collected from Archeological Sites through standard maceration techniques.
2. Study of pollen morphology e.g. structure and sculpturing, apertures, size etc in relation to its function.
3. Preparing reference collection of pollen or the pollen herbarium in form of permanent strew mount slides.
4. Identification of Palynomorphs other than pollen and spores in the strew mount slides e.g. Tissue fragments, Algae and Animal remains.
5. Pollen identification through standard keys.
6. Interpretation of palynological data in terms of pollen Diagrams and Maps.
7. Preparing Pollen for Phase Contrast and Electron Microscopy
8. Mandatory Field Study tour to the Archeological sites near Lahore to collect soil samples for palynomorphs extraction representing plants through standard maceration techniques. Students shall be required to prepare a field study tour report in addition to the Practical copy and produce it at the time of Practical Examination. Both practical copy and Field report shall carry separate marks. Any student not attending the field study tour shall lose those marks (Field report).

### **Teaching-learning Strategies**

1. Lectures
2. Group Discussion
3. Laboratory work
4. Field visits/ Workshop

### **Learning Outcome:**

Students will be able to:

1. How plants evolved as shown from the fossil record.
2. How to identify and classify palynomorphs.
3. How to use palynofacies to reconstruct sedimentary environments.
4. How to use plant fossils in palaeoclimate reconstructions.
5. How sedimentary transport and post-depositional processes control the plant fossil record.

### **Assessment Strategies:**

1. Lecture Based Examination (Objective and Subjective)
2. Assignments
3. Class discussion
4. Quiz
5. Tests

### **Recommended Readings:**

1. Dolores, R. Piperno (2006). Phytoliths: A Comprehensive Guide for Archaeologists and Paleoecologists. AltaMira Press (January 23, 2006). Pp. 304.
2. Faegri, K., Kaland, P.E, Krzywinski, K. (Latest Edition). Text book of Pollen Analysis, 4<sup>th</sup> edn. Wiley, Chichester.
3. John, M. Marston (Editor), Jade d'Alpoim Guedes (Editor) Christina Warinner (Editor). Method and Theory in Paleoethnobotany – February 15, 2015
4. Kenoyer, J. M. (Latest Edition). Ancient Cities of the Indus Valley Civilization. Oxford University Press.
5. Pearsall, D.M. (2015). Paleoethnobotany. A handbook of procedures. Routledge; 3 edition (September 2, 2015). PP 513
6. Weber, S.A. (1991). Plants and Harappan Subsistence. Westview.
7. Weber, S.A. and Belcher, W.R. (2003). Indus Ethnobiology. Lexington Books.

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