



Code	Subject Title	Cr. Hrs	Semester
BOT-318	Palynology Lab	1	VI
Year	Discipline		
3	Botany		

Syllabus Outline: Extraction of Pollen and Spores, Preparation of Strew Mount Slides, Single Grain Manipulation and their Technical Description, Field Study Tour for the Collection of Rock Samples from Salt Range, Pakistan and a Comprehensive Field Report of Study Tour.

Course Outline:

1. Extraction of pollen and spores from Anther/Strobili/Sori, their Identification and Technical Description.
2. Palynological Analysis of Paleozoic, Mesozoic and Cenozoic Rock samples through Standard Procedures.
3. Preparation of Strew Mount Slides and Single Grain Manipulation(s).
4. Field Tour to the Salt Range, Pakistan to study Paleozoic, Mesozoic and Cenozoic Outcrops including Sample Collecting Techniques. Each student shall be required to submit a comprehensive Field Tour Report at the time of Practical Examination. Specific marks shall also be allocated for such a report.

Module Aims: This course is designed to understand the Importance, Scope and Applications of Palynology in other Fields, techniques used to Isolate palynomorphs, their Technical Description and Evaluation of Palynological Data.

Learning Strategies:

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

Learning Outcome: After getting through this subject, students would be able to study Extant and Extinct Palynomorphs extracted through different Standard Techniques, to describe the Data Technically and Preparation of Permanent Mounts of this material, Field Study Tour would enhance their knowledge pertaining to the Preparation of Comprehensive Field Report and presentation of the data scientifically.

Assessment Strategies:

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



Books Recommended:

1. **Hesse, M., Halbritter, H., Weber, M., Buchner, R., Frosch-Radivo, A. and Ulrich, S. (2010).** *Pollen Terminology: An Illustrated Handbook*. (1st Ed.), Springer Link Publishers. 264pp. **ISBN-13: 978-3211999356.**
2. **Icon Group International, (2010).** *Microtechnique: Webster's Timeline History, 1893 – 2005*. 24pp. ICON Group International, Inc. **ASIN: B003L5DP80.**
3. **Phipps, D. and Playford, G. (2010).** *Techniques for Extracting Palynomorphs from Sediments*. Department of Mineralogy and Geology. sp. pub. Univ. Queensland, Brisbane, Australia.
4. **Shah, S.M.I. (1977).** *Stratigraphy of Pakistan*. Memoirs of the Geological Survey of Pakistan, v. 22, pp. 381.
5. **Traverse, A. (2007).** *Palaeopalynology: Topics in Geobiology*. (2nd Ed.), Springer Link Publishers. 813 pp. **ISBN-13: 978-1402066849.**
6. **Punt, W., Blackmore, S., Hoen, P.P., Nilsson, S. and Thomas, A. Le (2007).** *Glossary of Pollen and Spore Terminology. Review of Palaeobotany and Palynology*, 143(1): 1-81.
7. **Armstrong, H. and Brasier, M. (2005).** *Microfossils*. (2nd Ed.). J. Wiley-Blackwell Scientific Publishers. 304pp. **ISBN-13: 978-0632052790.**
8. **Harley, M., Morton, C.M. and Blackmore, S. (2000).** *Pollen and Spores: Morphology and Biology*, Royal Botanic Gardens, Kew. 530pp.
9. **Gee, E R. (2000).** *Geological Maps of Salt Range*. Geological Survey of Pakistan.
10. **Kurmann, M.H. and Doyle, E. (1994).** *Ultrastructure of Fossil Spores and Pollen*. Royal Botanic Gardens, Kew. 227pp. **ISBN-13: 978-0947643607.**
11. **Soil Survey of Pakistan (2000).** *Topographic Sheets of Salt Range, Pakistan*.
12. **Collinvaux, P.A., De Oliveira, P.E. and Moreno, E. (1999).** *Amazon: Pollen Manual and Atlas*. Harwood Academic Publishers. 344pp. **ISBN-13: 978-9057025877.**