COURSE TITLE: ADVANCE BOTANY-III (PALYNOLOGY)

CREDIT HOURS: 3

Introduction:

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 ofPalynological Data.

Learning Outcome: After getting through this course students would be able to know about Palynology, its Branches and their Importance, they would be able to Isolate Palynomorphs from Sedimentary Rock samples through different Maceration Techniques. Field Study Tour would enhance their knowledge of theory and better understanding of the subject.

Course Outline:

Neopafynology:

Production and Dispersal of Spores and Pollen

Ultra-structure and Stratification of Exine.

Spore and Pollen Diversity, Morphology and Omamentational Pattern, Technical

Description.

Environmental Palynology, Occurrence and Significance of Airborne Pollen with respect to Allergies and Asthma, Control Measures.

Mellitopalynology, Aeropalynology and Archaeopalynology. Palynology in Medicine and Criminology. Palaeopalynology:

Ultra-structure and Chemical composition of Fossil Exine.

Palynomorphs as Sedimentary Particles, Preservation in Sediment, Post Depositional Hazards.

Palynomorphs in Oil and Gas Exploration, Geochronology, Stratigraphic

Correlation, Reconstruction of Past Plant communities. Index Palynomorphs,

Organic Thermal Maturity.

Technical Description of Palynomorphs.

Maceration Techniques and Field Work.

Evaluation Criteria

Examination	Type	Marks
Internal Examination	Sessional Work	15%
	Mid-Semester	25%
External Examination	Final Semester	60%

Books Recommended:

Agashe, S.N., & Caulton, E. (2009). *Pollen and Spores: Applications with Special Emphasis on Aerobiology and Allergy*. Enfield, NH: Science Publishers.

Brooks, J. (2010). *Organic Maturation Studies and Fossil Fuel Exploration*. London: .Academic Press,

Erdtman, G. (2008). *An introduction to pollen analysis*. New York: Morison Press.

Scott, A.C. (2009). Coal and Coal-bearing strata; recent advances. Blackwell Scientific Publishers, Oxford.

4. 260pp. ISBN-13: 978-1443723077.

5. Traverse, A. (2007). Paleopalynology: Topics in Geobiology. (2nd Ed.), Springer Link Publishers. 813pp. ISBN-13: 978-1402066849.

6. Harley, M., Morton, C.M. and BIackmore, S. (2000). Pollen and Spores: Morphology and Biology, Royal Botanic Gardens, Kew. 530pp.

7. Kapp, P.O., Davis, O.K. and King, J.E. [Illustrated by Hall, R.C.] (2000). Ronald 0. Kapp's Pollen and Spores. (2nd ed.), AASP Found. 279 pp. ISBN 931871-05-0.

8. Kurmann, M.H. and Doyle, E. (1994). Ultrastructure of Fossil Spores and Pollen. Royal Botanic Gardens, Kew. 227pp. ISBN-13: 978-0947643607.

9. Collinvaux, P.A., De Oliveira, P.E. and Moreno, E. (1999). Amazon: Pollen Manual and Atlas. Harwood Academic Publishers. 344pp. ISBN-13: 978-9057025877.

10. Traverse, A. (1996). Nomenclature and Taxonomy: Systematics. In: Jansonius, J. and McGregor, D.C. Eds., Palynology: Principles and Applications, American Association of Stratigraphic Palynologists Foundations, 11-28, Publishers Press.

11. Jones, G.D., (1995). Pollen of the Southeastern United States: with Emphasis on Melissopalynology and Entomopalynology. AASP Foundation Contribution Series No. 30: 76 pp., 104 photographic plates. ISSN 0160-8843.

12. Punt, W., BIackmore, S., Nilsson, S. and Thomas, A.L. (1994). Glossary of Pollen and Spore Terminology. LPP Contributions Series No. 1: 71pp. LPP Foundation, Laboratory of Palaeobotany and Palynology, University of Utrecht, Utrecht, The Netherlands. ISBN 90-393-0230-8.

TITLE: ADVANCE BOTANY-LAB-III (PALYNOLOGY)

CREDIT HOURS: 1

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. Palynologieal Analysis of Paleozoic, Mesozoic and Cenozoic Rock samples through Standard Procedures.

3. Preparation of Strew Mount Slides and Single Grain Manipulations).

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 Palynologieal 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.

Evaluation Criteria

Examination	Type	Marks
Internal Examination	Sessional Work	15%
	Mid-Semester	25%
External Examination	Final Semester	60%

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, me. 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 ofPalaeobotany 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