MANGALORE UNIVERSITY
DEPT. OF MARINE GEOLOGY

SYLLABUS – Ph.D. IN MARINE GEOLOGY

Papers	Particulars	Hours of instruction per week	Duration of exam hours	Marks			Credits
				IA	THEORY	TOTAL	
1.	Research Methodology	4	3	30	70	100	4
2.	Theoretical Foundations	4	3	30	70	100	4
3.	Specialization (Three Papers)	4	3	30	70	100	4
4.	Reviewing of Literature and planning of the proposed research work with a tentative title	16	--	--	--	200	8
						Total	**20**

PAPER - I: RESEARCH METHODOLOGY

Paper - I: Research Methodology

Unit–1: Introduction – Aim, objectives & scope of research in Earth Science Studies.

Unit–2: Research Data: Types of data/information and their sources.Primary,Secondary and Tertiary data.Methods of collection of Primary data-field observations and measurements, Questionnaire and interviews.Methods of sampling, labeling and packing/storage and transportation to the lab. Equipments, Tools and techniques used in offshore sampling.Field survey- Compass, Dumpy level, Theodolite, GPS, Spectro-radiometer, Resistivity meter etc. Types of Maps/illustrations used to represent various spatial and non-spatial information.

Unit-3: Laboratory Investigations: Methods of sample preparations for Physico-chemical analysis of various earth materials. Principles and methods of Instrumental Analysis – pH, EC, DO, Colorimeter, Spectrophotometer, Flourimeter, Magnetic instruments, AAS, X-RD, XRF, ICP-AES & ICP-MS Etc.

Unit-4: Computation, Analysis and Interpretation: Tools & techniques used in computation, analysis and interpretation of spatial & non-spatial data.Statistical and computer techniques, remote sensing and GIS applications.

Books for Reference:

1. Field Geology – F.H. Lahee – CBS Publications
2. Surveying and Fieldwork - Williamson, J – Constable and Co.
3. Handbook of Applied Geo-statistical Ore Reserve Estimation – M. David – Elsevier
4. Prospecting and Exploration of Mineral Deposits – M. Kuzvart and M. Bohmer – Elsevier
5. Principles of Geochemical Prospecting – Ginzberg, I.I. - Pergamon Press
6. Geographical Information System: A Guide to Technology – John C. Antenucci – Van Norstrand Reinhold Publications
7. Computers: Concepts and Uses - Mary Summer - Prentice Hall
8. Remote Sensing and Image Interpretation – T.M. Lillesand and R.W. Kiefer – John Wiley and Sons
9. Analytical Chemistry – Vogel I and II Editions

PAPER – II: THEORETICAL FOUNDATIONS

Unit-1: Geomorphology: Introduction – Scope and recent trends in geomorphology. Concepts in Geomorphology-Fundamental concepts, Morphometric analysis, Techniques of geomorphological mapping.

Geomorphic Processes: Exogenetic, endogenetic, glacial and morphotectonic processes. Landforms-Fluvial, Marine/Coastal, Denudational, Tectonic and structural landforms.Integrated Coastal Zone Management through RS & GIS.Satellite Oceanography, Coastal Processes & Coastal Oceanography.

Unit-2: Atmospheric Science: Composition of the atmosphere, Short- term and long-term variations in meteorological and climate parameters. Concepts of climate change: records / tracers and proxies for understanding paleoclimate and paleoceanography.

Geohazards: Natural Hazards, Meteorological hazards, River flooding, Land slides, Earthquakes, Volcanic eruption and Drought.
Environmental Pollution: Air, Water, Land and Noise pollution – Types, sources and causes of pollutions.

Unit-3: Geological Oceanography**:** Ocean floor Morphology, Sea level fluctuation, India's polymetallic nodule program and Antarctic expedition.

Physical Oceanography**:** Coastal and estuarine processes, waves, tides and currents. Physical properties of seawater.

Chemical Oceanography**:** Composition of seawater. Riverine and atmospheric inputs to oceans. Sediment water interactions and tracers for studying oceanography. Marine Geochemistry.

Unit-4: Paleoceanography & Paleoclimate, Fundamentals of Environmental Magnetism, Magnetic properties of environmental samples. Paleoclimate, Paleoceoanography.

Books for References:

1. Principles of Geomorphology - Wiley Eastern – W.D. Thornbuy (1954)
2. Introduction to Coastal Geomorphology – John Pethic
3. The Study of Landforms - Cambridge Uni.Press - R.J. Small
4. Environmental Science - An Introduction - G.Tyler Miller, Wordsworth Publ. Co.
5. Environmental Geology – Edward Keller, CBS Publications
6. Environmental Geology – C. W. Montgomery, WMC Brown Publ. Co.
7. Introduction to Geochemistry – Krauskopf, E. B. McGraw Hill
8. Geochemistry – Rankama and Sahama, Chicago University Press
9. Geochemistry – Brownlow, A. N. Prentice Hall
10. India's Mineral Wealth - Oxford Univ. Press Brown & Dey (1975)
11. Indian Mineral Resources - Kirshnaswamy

12. Earth Resources - Skinner
13. Oceanic Mineral Resources - John L Mero Bamery, K.D.
14. Mineral Deposits of the Deep Ocean Floor - Skinner B .J. and Ulimanns
15. Introduction to Oceanography – Rose, D.A.
16. Oceanography – Yasso, W.I.
17. Chemical Oceanography - J.P Riley and R.Chester Vol.1-8, Academic Press, London.
18. The Chemistry of the Atmosphere and Ocean - Holland, D.H. John Wiley & Sons, New York.
19. Environmental Geology – Edward Keller, CBS Publications
20. Ecology, Environment and Pollution - A. Balasubramanian, Indira Publishers, Mysore
21. Atmosphere,Weather and Climate : An introduction to Meteorology – Narora-S.B
22. Meteorology-William L Donn (1975)-McGraw-Hill Book Co. New York
23. An Introduction to Dynamic Meteorology – J R Holton (1992) – III Ed, Academic Press
24. Climatology - A.K. Baura - Dominant Publs.
25. Environmental Magnetism - R.Thompson and F. Oldfield

PAPER – III: SPECIALIZATION

GEOCHEMISTRY, PALEOCLIMATOLOGY AND PETROLOGY

Geochemistry: Latest developments in different fields of geochemistry discipline such as aqueous geochemistry, sedimentary geochemistry, atmospheric chemistry and marine Geochemistry.

Biogeochemistry: Importance of biogeochemistry and bio-inorganic chemistry. Local/regional biogeochemical cycles, for understanding the climate change.

Isotope Geochemistry: Advancement in the fields of radioactive, stable and radiogenic isotopes and their applications for understanding the earth, atmospheric and oceanographic processes.

Paleoclimate and Paleoceanography: Applications of chemical and isotope tracers for understanding the natural processes and anthropogenic activities in the history of the earth and marine systems. Paleomagnetism, environmental magnetism.

Igneous Rocks: Classification of igneous rocks, Petrogenesis granite, pegmatites, syenites, gabbro, anorthosite, basalts.

Metamorphic rocks: Introduction, definition and types, diagenesis vs. metamorphism. Textures and structure of metamorphic rocks. Metamorphic Rocks- granulites, quartzites, schists, slates and marbles.

Books for Reference:

1.Inorganic Geochemistry – Henderson P (1982) – Oxford – Pergamon
2.Introduction to Geochemistry – Krauskopf, E. B. McGraw Hill
3.Geochemistry – Rankama and Sahama, Chicago University Press
4.Principles of Geochemistry – Brain Massan, Wiley eastern limited
5.Geochemistry – Brownlow, A. N. Prentice Hall
6.Petrology – Loren A Raymond, Wm C. Brown Publishers, Chicago
7.Principles of Petrology – G. W. Tyrell, Asia Pub. House, New Delhi
8.Petrology – Ehlers and Blatt, CBS Publ
9.Igneous and Metamorphic Petrology – Turner and Verhoogen, CBS Publications
10. Igneous and Metamorphic Petrology – Best, CBS Publications
11. McElhinny, (1973) Palaeomagnetism and Plate Tectonics. Cambridge Univ. Press, 358 p.

PAPER – III: SPECIALIZATION

RS AND GIS APPLICATIONS IN NATURAL RESOURCES MAPPING

Natural resources – Renewable and non-renewable resources. Water, mineral and rock resources, Soil resources, Fossil fuel resources, Agricultural and forest resources, petroleum deposits. Marine Resources: Placer deposits, deep ocean polymetalic nodules, metaliferous sediments and gas hydrates, resource exploration.

Fundamentals of RS - Electromagnetic spectrum, Sensors, platforms and RS data acquisition systems Multispectral, hyperspectral, thermal sensors and microwave sensors. Important Remote sensing satellites like Landsat, SPOT, IKONOS, NOAA and IRS series of satellites and their payloads. Image interpretation. Visual and digital image analysis. Digital image processing - Image restoration. Image enhancement and visualization Image interpretation and classification. Introduction to Digital Photogrammetry, Introduction to Satellite photogrammetry. Generation of thematic information from satellite images and aerial photographs.

Principles of Geographical Information Systems. Theory of GIS supported by extensive practical exercises, Geographic information and spatial data types, Hardware and software; Raster and Vector GIS; Steps of spatial data handling, Database management systems. Spatial referencing Data quality, measures of location errors on maps, satellite-based positioning, Spatial data input and data preparation. DEM and its applications.

RS and GIS applications in Natural resource mapping Agriculture and Soils, forestry, earth sciences, geology and water resources, geomorphology, land use application, environmental analysis and managements, Marine science and human settlement analysis. Applications of RS and GIS in natural resources management and conservation, watershed development and management, water quality analysis, Water diversion projects, interlinking /inter –basinal/intra-basinal water transfer projects and their study. Ground water exploration and ground water potential zone mapping.

Books for Reference:

1. Dobrin, M.B.1976 Introduction to Geophysical Prospecting. New York McGraw-Hill, 630p.
2. Hydrogeology (2nd ed.) – C.W. Fetter – Merrill Publishing Co. U.S.A.
3. Handbook of Applied Hydrology-V.T.Chow (Ed) – McGraw-Hill Book Co. New York
4. Hydrogeology – K. R. Karanth – Tata McGraw Hill Publishing Co. Ltd.
5. Manual of Photo Interpretation – American Society of Photogrammetry.
6. Remote Sensing and Image Interpretation – T. M. Lillesand and R. W. Kiefer – John Wiley and Sons.
7. Remote Sensing and Photogrammetry, vol. 1 and vol. 2 – M. L. Jhanwar and T. S. Chouhan – Vignan Prakasan, Jaipur.
8. Applied Remote Sensing and Photo Interpretation – T. S. Chouhan and K. N. Joshi – Vignan Prakasan, Jaipur.
9. Photogeology and Image Interpretation – Shiv N. Pandey – Wiley Eastern, New Delhi.
10. Fundamentals of Photogeology, Geomorphology – Verstappen – TTC Holland.

PAPER – III: SPECIALIZATION

COASTAL PROCESSES, GEOMORPHPLOGY, SEDIMENTOLOGY AND PALEANTOLOGY

Coastal Geomorphology: Coastal and estuarine landforms, beach morphology.
Coastal and estuarine Processes, Coastal Oceanography, Application of RS & GIS in Coastal, Marine and Water Resources. Integrated Coastal Zone Management.

Waves - Wave producing forces, types of waves.
Currents – Causes for ocean currents, types of currents, uses of currents.
Tides - Causes for formation of tides, types of tides, uses of tides.
Physical properties of seawater.

Sedimentology: Sources and formation of sediments, classification of sediments and sedimentary rocks. Diagenesis of sediments. Sedimentary rocks - Conglomerates, sandstone, limestone, dolomite, shale and laterite.

Micropaleontology - Collection of samples and separation of microfossils. Foraminifera, radiolaria, diatoms, ostracodes, dinoflagellates.
Applications of microfossils.

Books for Reference:

1. Sedimentary Rocks, CBS Pub. – F J. Pettijohn (1984).
2. Petrology of sedimentary rocks – Greensmith.
3. Geodynamics Elsevier - Artyushkov E.V. (1983)
4. Plate Tectonics and Crustal Evolution, Pergamon Press - Condie, K.C. (1989)
5. Morisawa, M. 1985. Rivers, Longman, London 222p.
6. Murthy, K.S. 1998. Watershed management in India, 3rd edition, Wiley Eastern Ltd.New Age International Ltd, New Delhi, 198 p.
7. Pethick, J. 1984. An introduction to Coastal Geomorphology, Edward Arnold, London, 259p.
8. Ritter, D.F., R.C. Kochel and J.R. Miller (2011) *Process Geomorphology, 5th edition*. McGraw Hill, NY. Rental text.
9. Summerfield, M.A. (Editor), 1991. Global Geomorphology: An introduction to the study of landforms, John Wiley and Sons Ltd., New York: 560p.
10. Thornbury, W.D. (1969): Principles of Geomorphology, Wiley Eastern Limited, New Delhi: 594 p.
11. Tinkler, 1985. A short history of Geomorphology, Croom-Helm, London.
12. Principles of Micropaleontology, Hafner - Glassner, M.F. (1972)
13. Micropalaeontology, George Allen and Unwin -Brasier M.D. (1980)
14. Micropalaeontology, Graham & Trotman - Bignot, G. (1985)
15. Invertebrate Fossils, Mcgraw Hill - Moore, Lalicker and Fisher (1952)
16. Introduction to Micropalaeontology - Haq, B.U.

PAPER – IV: REVIEW OF LITERATURE AND PLANNING OF THE PROPOSED RESEARCH WORK WITH A TENTATIVE TITLE

Unit-1: Significance of literature survey and their source, browsing Internet & e-journals. Methods and importance of citation. Selection of Research topic. Format & methods of writing research synopsis and research papers and dissertation in Earth Science studies.

Literature survey of Text Books, Journals, Seminar, Conference Volumes, Technical Manuals, Protocols in hard and soft copies.

Review of literature: Material available from the Scholar Web sites, Subject sites Conference / Workshop / Seminar proceedings. Definitions of technical terms, methodologists, etc.,

Unit-2: Planning of the Proposed Research: Selection of Hypothesis. Definition of the concept and objectives. Review of previous work. Assessment of Logistics and technology.

Unit-3: Data: Collection of data via sampling techniques. Data storage, analysis and interpretation of data.

Publications: Publication of Research Papers in peer reviewed journals prior to submission thus providing strong theoretical basis to the objectives.

Unit-4: Title: Title should reflect the theme of the thesis, the area of research and probable significance. Formulation of thesis; Presentation of thesis in appropriate language, specific figures, graphs, tables, photographs, etc., Documentation of the thesis using prescribed standards.

MANGALORE UNIVERSITY
DEPARTMENT OF MARINE GEOLOGY

Dr. C. Krishnaiah
Chairman

No. MU/DMG/169/2011-12 08.06.2011

To,

Registrar
Mangalore University,
Mangalagangothri.

Dear Sir,

Sub. : Submission of Syllabus for Ph.D Programme in Marine Geology
Ref. : ಮಂವಿ/ಶೈಕ್ಷಣಿಕ/ಸಿಆರ್36/2010-11/ಎ2 ದಿ. 10.03.2011

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With reference to the above subject, I am enclosing herewith a copy of the Syllabus for Ph.D Programme in Marine Geology, which has been approved by the P.G. Board of studies in Marine Geology. This is for your kind reference and necessary action in this regard.

Thanking you,

Yours sincerely,

CHAIRMAN

MANGALORE UNIVERSITY

MANGALORE UNIVERSITY
DEPARTMENT OF MARINE GEOLOGY

Dr. C. Krishnaiah
Chairman (BOS)

No. MU/DMG/BOS/140/2011-12 30.05.2011

Dear Sir,

Please find herewith enclosed the syllabus for Ph.D. Coursework.

Since the members of the PG Board of studies in Marine Geology are not likely to meet shortly, I am requesting you to send your comments/ approval by return of post. However, if no communication is received from you within 6th June 2011, it will be presumed that you have approved the above said item.

Thanking you,

Yours sincerely,

(Chairman)

1. Prof. R. Shankar, Member, Dept. of Marine Geology, Mangalore University
2 Dr. K.S. Jayappa, Member, Dept. of Marine Geology, Mangalore University
3. Dr. Shivanna, Member, Dept. of Marine Geology, Mangalore University
4. Prof. S. Govindaiah, Reader, Dept. of Geology, University of Mysore, Manasagangothri, Mysore – 570 006.
5. Prof. Shadakshara Swamy N., Dept. of Geology, Bangalore University, Jnanabharathi Bangalore –560056.

MANGALORE UNIVERSITY
DEPARTMENT OF MARINE GEOLOGY

Dr. C. Krishnaiah
Chairman

Dt. 09.05.2011

Dear Sir,

Kindly find enclosed the syllabus for the PhD coursework in Marine Geology leading to the Ph.D Degree. I request you to kindly provide your valuable suggestions if any.

Thanking you,

Your sincerely,

(Dr. C. Krishnaiah)

MANGALORE UNIVERSITY
ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ
ಜ್ಞಾನಸುಧೆ-ಬೆಳಕು