

Date- 30/11/2023

To

Registrar

IGNTU, Amarkantak

Subject: Submission of minutes of the BOS in Geology-reg.

Sir

This is to inform you that a meeting of BOS was conducted in the Department of Geology on 10th August 2023 at 11:00 A.M. to address minor revision of PhD course work syllabus and inclusion of two new papers.

The minutes and copy of the newly revised course work syllabus are being placed for your kind perusal and further necessary action.

Thanks

Sincerely


30/11/2023

सू. गुरु दिमाग / Head
Department of Geology
इन्दिरा गांधी राष्ट्रीय जनजातीय विश्वविद्यालय
Indira Gandhi National Tribal University
अमरकंटक (म.प्र.) / Amarkantak, M.P.-484887

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Minutes of the meeting

A meeting of the Board of Studies (BOS) in Geology was held on 10th August 2023 in the Department of Geology at 11:00 am.

The meeting was attended by following members:

1.	Prof. Awadhesh Kumar Shukla	Head, Department of Geology	Chairman and Convener, BOS
2.	Dr. Meraj Alam	Assistant Professor, Department of Geology	Member
3.	Prof. Tarun Thakur	Head, Department of Environmental Sciences	Member (VC Nominee)
4.	Dr. Ram Bhooshan Tiwari	Assistant Professor, Department of Geography	Member (VC Nominee)

The external members, Prof. U.K. Shukla and Prof. Jayant Pati had given their consent to the minor changes online.

Agenda for the meeting


1. Minor revision of Ph.D. course work syllabus for inclusion of papers.
2. Any other matter with the permission of the chair.

Minutes


1. The PhD course work syllabus was revised as per the IGNTU guidelines. Two new papers GEOEC-104 (Hydrogeology, Remote sensing & GIS) and GEOEC-105 (Metamorphic Petrology and Thermodynamics) were included in the existing syllabus.
2. The credit structure was revised in accordance with the Ph.D. guidelines of IGNTU.
3. The new syllabus shall be taught from the Academic year 2023-24, with immediate effect.


10/08/23

Dr. Meraj Alam
Member


10/08/2023

Prof. Tarun Thakur
(VC Nominee)


10/08/23


Dr. Ram Bhooshan Tiwari
(VC Nominee)

ONLINE APPROVAL

Prof. Jayant Pati

ONLINE APPROVAL

Prof. U.K. Shukla


12/08/2023
Prof. A.K. Shukla
Chairman, BOS



Courses Offered in PhD (Geology) Program

(A) Mandatory Core Courses

Nature of Course is Compulsory		
Course Code	Title	Credits/Marks
PCC-101	Research Methodology	04 / 100
PCC-102	Computer Applications and Data Analysis	04 / 100
PCC-103	Research and Publication Ethics	02 / 50

(B) Discipline Specific Core Courses

Nature of Course is Discipline Specific Elective Theory		
Courses Code	Title	Credits / Marks
Any one of the following-		
GEOEC-101	PRECAMBRIAN CRUSTAL EVOLUTION AND GEOCHEMISTRY	04 / 100
GEOEC-102	LATE PALEOCEANOGRAPHY, PALEOCLIMATOLOGY AND BIOSTRATIGRAPHY	04 / 100
GEOEC-103	DEFORMATION: ITS KINEMATICS AND DYNAMICS	04 / 100
GEOEC-104	HYDROGEOLOGY, REMOTE SENSING AND GIS	04 / 100
GEOEC-105	METAMORPHIC PETROLOGY AND THERMODYNAMICS	04 / 100
Nature of Course is Department Level		
GEOECP-101	Review of literature and presentation of a seminar on a research theme related topic approved by concerned DRC & RAC	2 / 50
Total Credit (A+B)		16
Duration of the entire course 06 Months (One Semester)		


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(B) DISCIPLINE SPECIFIC CORE COURSES

GEOEC-101: PRECAMBRIAN CRUSTAL EVOLUTION AND GEOCHEMISTRY

Unit-I: The Precambrian geological record and petrological, chemical and tectonic evolution of the crust and mantle. Special emphasis on Indian Precambrian record.

Unit-II: Magmatism in relation to plate tectonics; partial melting (batch and fractional melting); Crystal fractionation (equilibrium and fractional (Rayleigh) crystallization).

Unit-III: Chemical characteristics of igneous rocks in the following tectonic setting: Mid Oceanic Ridge, Island Arcs, Oceanic plateaus, Continental Margins, Continental Rifts and Continental intraplates; Plume magmatism and hot spots; Large Igneous Provinces (LIP), mafic dyke swarms.

Unit-IV: Application of major, trace and Rare Earth elements in petrogenesis. Geological controls of trace elements distributions. Understanding of trace element partition coefficient (k_{ds}). Magma generation in different tectonic scenario: minor elements finger-printing (through spider-diagram and rare earth elements patterns) for source characterization and magma tectonics.

Suggested Reading:

1. Marjorie Wilson, 1989. Igneous petrogenesis
2. Cox, KG, Bell, JD and Pankhurst, RJ, 1993. The Interpretation of Igneous Rocks. Chapman & Hall, London
3. Rollinson, HR 2007. Using geochemical data-evaluation, presentation and interpretation. 2nd edition. Longman Scientific & Technical
4. Blatt H., Tracy R.J. and Owens B.E. (2006): Petrology – Igneous, sedimentary and Metamorphic (3rd Edition), W.H. Freeman and Company, New York.
5. Bose M.K. (1997): Igneous Petrology. The World Press Pvt. Ltd.
6. Bowen N.L. (1928): The evolution of Igneous Rocks. Princeton Univ. Press. N. J.
7. Ehlers, E.G. and H. Blatt (1982): Petrology, Igneous, Sedimentary and Metamorphic. Freeman and company.
8. Hatch F.H., Wells A.K and Wells M.K. (1984): Petrology of the igneous rocks, CBS.
9. Philpotts A.R. (1994): Principles of igneous and metamorphic Petrology, Prentice Hall of India.
10. Philpotts, A and Ague, J (2009): Principles of igneous and metamorphic petrology, Cambridge University Press Publishers,
11. Turner F.J & Verhoogen J. (1951): Igneous and Metamorphic Rocks, McGraw Hill.
12. Williams H, Turner F.J & Gilbert C.M. (1955): Petrography, W.H. Freeman and company. San Francisco.
13. Winkler Helmut G.F. (1987): Petrogenesis of Metamorphic Rocks (Fifth Edition), Narosa Publishing House, New Delhi.
14. Winter J. D. (2001): An Introduction to Igneous and Metamorphic Petrology, Prentice Winter, John D. (2010): Principles of igneous and metamorphic petrology, PHI learning Pvt Ltd

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GEOEC-102: LATE NEOGENE PALEOCEANOGRAPHY, PALEOCLIMATOLOGY AND BIOSTRATIGRAPHY

Unit I: Introduction to the Late Neogene Time scale; Magnetic Stratigraphy in Paleoceanography; Late Neogene Events Paleoceanography; Late Neogene Tectonic Events; Introduction to Paleoclimate; Important Late Neogene Paleoclimatic events and their causes; Deep-Sea Sediment Cores; Ice-Cores.

Unit II: Proxies in Late Neogene Paleoceanography and Paleoclimatology; Introduction to low latitude inter-ocean exchange systems. Planktic Foraminifera- detailed taxonomy, applications in Paleoceanography and paleoclimatology.

Unit III: The Use of Oxygen and Carbon Isotopes of Foraminifera in Paleoceanography; Radiocarbon Dating of Deep-Sea Sediments; Elemental Proxies for Reconstructing Cenozoic Seawater Paleotemperatures from Calcareous Fossils.

Unit IV: Concept of Biostratigraphy; Types of Biozones and their formulation; Biostratigraphic Correlation; Graphic Correlation; Applications of Biostratigraphy.

List of Recommended Books:

1. Armstrong, H. and Brasier, M. (2005). Microfossils, Blackwell publishing.
2. Berggren, W.A. and van Couvering, J.A., (1974). Late Neogene: Biostratigraphy, Geochronology and Paleoclimatology of the Last 15 Million Years In Marine And
3. Bolli, H.M., Saunders J. B. and Perch Nielson, K., (1985). Plankton Stratigraphy, Cambridge Univ. Press, Cambridge.
4. Bradley, R.S., (1999). Paleoclimatology: Reconstructing the Climates of Quaternary, Elsevier
5. Continental Sequences, Elsevier.
6. Gradstein, F.M., Ogg, J.G., Schmitz M., and Ogg, G. 2012. The Geologic Time scale 2012. Elsevier
7. Hag, B.U. and Boersma, A., (1998). Introduction to Marine Micropaleontology, Elsevier.
8. Hillare-Marcel, C. and Vernal, A. De, (2007). Proxies in Cenozoic Paleoceanography, Elsevier.
9. Kennett, J.P. and Srinivasan, M. S., 1983. Neogene planktonic foraminifera A Phylogenetic Atlas, Hutchinson Ross. Publ. Co., U.S.A.
10. McGowran, B. (2005). Biostratigraphy: Microfossils and Geological Time, Cambridge University Press.


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GEOEC-103: DEFORMATION: ITS KINEMATICS AND DYNAMICS

Unit-I: Methodologies and approaches to understand Neotectonics, River dynamics; River responses to neotectonics

Unit-II: Concept of rock deformation. Stress and Strain in rocks, 2-D stress and strain analysis; Strain ellipses of different types and their geological significance. Behaviour of rocks under stress: elastic, plastic, viscous and viscoelastic responses and their geological significance. Mechanics of rock fracturing: fracture initiation and propagation; Coulomb's criterion and Griffith's theory.

Unit-III: Introduction to ductile shear zones: significance of mylonite, cataclasite, gouge.

Unit-IV: Introduction to Experimental Structural Geology: High P-T experiments with rock samples: basic concepts and important examples. Analog modeling of deformational structures and its geological importance: concept of experimental scaling. Published examples of sandbox/shear box experiments and their extrapolation to natural situations

List of Recommended Books:

1. Condie, Kent. C. (1982): Plate Tectonics and Crustal Evolution, Pergamon Press Inc.
2. Park, R. G. (2004) Foundations of Structural Geology. Chapman & Hall.
3. Billings, M. P. (1987) Structural Geology, 4th edition, Prentice-Hall.
4. York Fossen, H. (2010): Structural Geology, Cambridge University Press
5. Ghosh, S.K. (1993): Structural Geology: Fundamental and Modern Development. Pergamon Press.
6. Twiss, R.J. and Moores EM 2007 Structural Geology Freeman
7. Van der Pluijm, B.A. and Marshak, S 2004. Earth Structure: an introduction to structural geology Tectonic. W. W. Norton and Company Ltd.
8. Anderson R.S. and Burbank, D.W., 2008. Tectonic Geomorphology, Blackwell.


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GEOEC-104: HYDROGEOLOGY, REMOTE SENSING AND GIS

Unit I

Groundwater origin, Hydrologic cycle, Hydrologic properties of rocks – Porosity, Permeability, specific yield, specific retention, hydraulic conductivity, transmissivity, and storage coefficient. Types of aquifer, drainage basin, morphometric analysis. Groundwater movement and use of radioactive tracers, Darcy's law and its applications, Determination of Permeability in laboratory and field.

Unit II

Groundwater provinces of India. Prospecting for groundwater. Surface and subsurface geophysical exploration techniques. Hydro chemical studies: Quality of water, methods of analysis, treatment of water and groundwater management and stable isotope geochemistry.

Unit III

Remote Sensing-Basic concepts, Electromagnetic radiation and spectrum. Types of Sensors and Platforms. Atmospheric windows, Multispectral remote sensing, remote sensing in microwave region. Infrared, Thermal. SAR and Hyperspectral remote sensing techniques. Application of remote sensing in identification of groundwater in hard rock terrain and unconsolidated sediments, indicators for groundwater, Lineaments: Definition, Concepts and characteristics.

Unit-IV

GIS –Introduction to GIS, ArcGIS and QGIS software. Raster and Vector images. Projections – Types of projections and their importance. Data structure and their types. Digital Elevation Model: Methods of DEM preparation -Products of DEM and applications of DEM. History of Cartography and types of Maps: Digital Cartography. Introduction to multispectral remote sensing using UAV/Drone technology.

REFERENCES

1. Ground water hydrology, Todd, D.K., (1987), John Wiley & Sons, New York.
2. Karanth, K.R., Hydrogeology. Tata McGrawHill Publ., New Delhi.
3. Remote Sensing principles and interpretation, by Sabins, F.F. jr 1978.
4. Remote Sensing and Image Interpretation by Lillisand T.M. and P.W. Kiefer, 1986.
5. Remote Sensing Geology by R.P. Gupta, 1991.
6. Jensen, J.R 1986: Introductory Digital Image Processing: A Remote Sensing Perspective. Prentice. Hall, New York.
7. Borough, P.A 1986 principles of geographical information systems for land resources assessment, vkarabdibe press, oxford.
8. Introduction to Geochemistry, principles and application by K. C. Mishra.
9. Discovering GIS and ArcGIS by Bradley A. Shellito.
10. UAV or Drones for Remote Sensing applications by Felipe Gonzalez and Antonios Tsourdos.


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GEOEC-105: METAMORPHIC PETROLOGY AND THERMODYNAMICS

Unit I: Definition and Conditions of Metamorphism, Metamorphic Agents and Changes, Types of Metamorphism, Classification of Metamorphic Rocks, Structures and Textures of Metamorphic Rocks, Nature of Metamorphic Reactions

Unit II: Introduction of Thermodynamics, The First Law of Thermodynamics, The Second Law of Thermodynamics, The Third Law of Thermodynamics, The fundamental equation, the first and second laws combined, Volume, Entropy, Enthalpy, Gibbs Energy, Heat Capacity

Unit III: Phase Rule and Phase diagram, ACF, AKF and AFM Diagrams, Isograds and Reaction Isograds, Construction of Phase Diagrams for Multicomponent Systems after the Method of Schreinemakers

Unit IV: Regional Metamorphism and Plate Tectonics, Paired Metamorphic Belts, Migmatites and their Origin, Pressure-Temperature-Time Paths and Reaction History, Charnockites

List of recommended books

1. Mason Roger (1984): Petrology of the Metamorphic Rocks, CBS Publishers and Distributors, New Delhi.
2. Miyashiro A. (1998): Metamorphism and Metamorphic Belts, George Allen & Unwin, New York.
3. Philpotts, A.R. 1994 Principles of Igneous and Metamorphic Petrology, Prentice Hall
4. Passchier C.W, Myers J.S and Kroner A. (1990): Field geology of high grade gneiss terranes; Narosa Publishing house, Springer Verlag and IUGS.
5. Yardley Bruce W.D. (1989): An Introduction to Metamorphic Petrology, Longman Singapore Publishers (Pvt.) Ltd.
6. Frost, B.R. and Frost, C.D. 2014, Essentials of Igneous and Metamorphic Petrology, Cambridge University Press.
7. Winter, John D. (2010): Principles of igneous and metamorphic petrology, Prentice Hall.
8. Spry, A. 1976 Metamorphic Textures, Pergamon Press.
9. Sharma, Ram. S., 2016. Metamorphic Petrology: Concepts and Methods, Geological Society of India
10. Turner, F.J., 1980: Metamorphic Petrology, Mc Graw Hill.
11. Spear, F. S. 1993: Mineralogical Phase equilibria and pressure-temperature-time paths, Mineralogical Society of America.
12. Kula C Misra (2012) Introduction to Geochemistry: Principles and Applications, Wiley-Blackwell.
13. Spear, F. S. 1993: Mineralogical Phase equilibria and pressure-temperature-time paths, Mineralogical Society of America
14. Roger Powell 1978: Equilibrium Thermodynamics in Petrology: An Introduction, Harper & Row, Publishers London.


10/08/23




12/9/2023

Date- 10/11/2023

To

Registrar

ICNTT, Amarkantak

Subject: Submission of minutes of the BOS in Geology-04

Sir

This is to inform you that a meeting of BOS was conducted in the Department of Geology on 07 August 2023 at 11:00 A.M. to address minor revision of PhD course work syllabus and inclusion of new core papers.

The minutes and copy of the newly revised course work syllabus are being placed for your kind perusal and further necessary action.

Thank,



For Registrar
Department of Geology
ICNTT, Amarkantak
Jharkhand University
Amarkantak, Jharkhand-824202