

Course:
Brahmaputra Studies-Inter-Disciplinary Course (IDC)

Faculty members associated with Brahmaputra Studies (IDC)

1. Prof. Nitul Gogoi, Department of Anthropology
2. Dr. Siddharth Lahiri, Department of Applied Geology
3. Dr. Debojit Bezbaruah, Department of Applied Geology
4. Dr Chandan Kumar Sarma, Department of History
5. Dr. Alok Ranjan Kumar, Department of Economics
6. Dr. Kaustubh Kumar Deka, Department of Political Science
7. Dr. Obja Borah Hazarika, Department of Political Science
8. Dr. Ratamali Machahari, Dept. of Applied geology

Objectives of Brahmaputra Studies (IDC)

The Brahmaputra Studies(IDC) is aimed to acquaint the students with the multi-dimensional perspectives associated with the Brahmaputra basin. The inter-disciplinary approach will equip the students with an understanding of the formation of the Brahmaputra Basin, the drainage system associated with this region, issues of flood, erosion, development, flood control measures and the technologies, issue of dams and related debates, geopolitics associated with the Brahmaputra as a transboundary river, the riverine communities, cultures and economy.

Students are also supposed to have a preliminary practical understanding of map reading, appreciate different handles available in the Digital Elevation Maps (DEM) of the Google Earth and create maps of their own by handling ArcGIS tools.

Semester	Credit
I	2
II	4
III	4 + 2

COURSE-OVERVIEW:

Semester I: Brahmaputra Studies (IDC-I)- Credits-2 AEC-I

Title	Introduction to <u>Brahmaputra Studies 101</u>
Unit I	Geological background of the Brahmaputra Basin
Unit II	Drainage system and landforms of the Brahmaputra Basin
Unit III	River histories; Historical exploration of the origin of the Brahmaputra Basin

Semester II: Brahmaputra Studies (IDC-II)- Credits-4 GE-I

Title	Ecology, Riverine Communities and Geopolitics
Unit I	The Ecology of the Brahmaputra
Unit II	Riverine Communities, Cultures and Economy- Upper Assam
Unit III	Riverine Communities, Cultures and Economy- Lower Assam
Unit IV	Brahmaputra as a transboundary river, riparian nations and geopolitics

Semester III: Brahmaputra Studies (IDC-III)- Credits-4 GE-II

Title	Flood, Erosion and Displacement
Unit I	Changing history of the Basin: pre colonial and Colonial period.
Unit II	The Colonial State and the Flood Problem, Earth quakes and changing river systems in the basin
Unit III	Flood in post-independent period: Policies and Programs, Relief and Rehabilitation
Unit IV	Flood, Erosion and Displacement across the valley: Dams and Debates

Semester III: Brahmaputra Studies (IDC-IV)- Credits-2 AEC-II

Title	Technologies of Flood Control
Unit I	Technology of Embankments
Unit II	Porquippines and geotubes
Unit III	Impact and Issues related with Flood Control technologies

Brahmaputra Studies (IDC-I)-1st Semester
AEC-I: Introduction to Brahmaputra Studies 101

L	Pr	IS	ES	T
2	1	20	30	50

Unit I: Geological background of the Brahmaputra Basin (8 hours) Dr. Siddharth Lahiri

What constitutes a basin? How do basins evolve? Basin classification and placement of the Brahmaputra Basin within the system of classification; Subsurface sediment architecture of the Brahmaputra basin; Differences in approach between lithostratigraphy and sequence stratigraphy; Tools to know about the basement characteristics; Basement characteristics of the upper reach of the Brahmaputra valley; Differences between the basement controlled and basement independent sediment architecture of basins; Impact of mountain building on inter-montane basins; Characteristics of mountains surrounding the Brahmaputra valley and their impact on the evolution of the Brahmaputra valley.

Unit II: Drainage system and landforms of the Brahmaputra basin (6 hours) Dr. Debajit Bezbaruah

Basic drainage patterns and their geologic significance; Channel classification based on sediment loads, effects of valley slope and sediment load variability on sinuosity, bed-bank relationship etc.; Recent changes observed in the characteristics of the Brahmaputra River (like bank migration, braid bar variability, channel dynamics etc.) and some of its major tributary rivers; Evolution and erosion of the Majuli Island; Formation of Dibru-Saikhoa Island.

Unit III: Historical exploration of the origin of the Brahmaputra Basin (7 hours) Dr. Chandan kr. Sarma

Development of River histories and its historiography - India and abroad; Brahmaputra in Early and Medieval Literature, Inscriptions and the Brahmaputra; East India Company and Early Surveys of the Brahmaputra region, Rennell's maps and surveys regarding Brahmaputra, Colonial ethnography, Early Surveys and the Brahmaputra from late 18th century-Thomas Wood, Peter Wade, John Butler, John M'Cosh, William Robinson, Robert Pamberton; Surveys after 1857 and exploration regarding the origin of the Brahmaputra-Henry Harman; Explorations in early 20th century.

Note: The In-semester evaluation (Total: 20 marks) will consist of two components. A class test (Theory: 10 marks) and evaluation of practical exercises (Marks: 10).

Practical exercises: (1) Map reading: Types of maps, scale factor, directions, latitudes-longitudes, significance of contours etc.

(2) Use of Google Earth: Locating points, measuring distances, studying projections, comparing historical maps and imageries, preparation of location maps for the study area

(3) Elements of ArcGIS: Use of maps and imageries to prepare composite maps showing planform changes in the river dynamics and various landforms during different time-intervals.

References:

- 1) André Robert (2003). *River Processes-An Introduction to Fluvial Dynamics*. Published by Arnold, London (<http://www.arnoldpublishers.com>) Distributed in the USA by Oxford University press.
- 2) Arup Kumar Dutta (2001). *The Brahmaputra*. Published by National Book Trust, India, 2001. (p.237) [ISBN-13: 978-8123735443]
- 3) Arupjyoti Saikia (2019). *The Unquiet River - a biography of the Brahmaputra*. Oxford University Press. (p.620) [ISBN-13: 978-0199468119]
- 4) John S. Bridge (2003). *Rivers and Floodplains - Forms, Processes, and Sedimentary record*, Blackwell Publishing
- 5) Gianni Baldizzone, (1998), *Tales of the River Brahmaputra*, Local Colour Ltd, HK
- 6) Reena Choudhury, 2007, *Sahityat Brahmaputra*, Publication Board, Assam

Edited Volumes:

- 1) *Large Rivers-Geomorphology and Management*, Edited by Avijit Gupta (2007), John Wiley & Sons, Ltd.
- 2) 'The Brahmaputra Basin Water Resources' Editors: Singh, Vijay., Sharma, Nayan., Ojha, C. Shekhar P., Springer, 2004 (p. 613) [ISBN-13: 978-1402017377]
- 3) 'Neo-Thinking on Ganges-Brahmaputra Basin Geomorphology' by Editors: Balai Chandra Das, Sandipan Ghosh, Aznarul Islam, Md. Ismail, Springer, 2016 (p.177) [ASIN: B01ACZ6U7E]

Useful papers (chronologically from older to recent)

- Coleman, J. M., 1969. Brahmaputra River channel processes and sedimentation. *Sedimentary Geology* 3, 129-239.
- Goswami, D.C., 1985. Brahmaputra River, Assam, India: Physiography, Basin Denudation and Channel Aggradation, *Water Resources Research* 21, 959-978.
- Goswami, D.C., 1998. Fluvial regime and flood hydrology of the Brahmaputra River. *Assam. Mem. Geol. Soc. Ind.* 41, 53-75.

- Goswami, U., Sarma, J.N., Patgiri, A.D., 1999. River channel changes of the Subansiri in Assam, India. *Geomorphology* 30, 227-244.
- Bezbaruah, D., Kotoky, P., Baruah, J., Sarma, J.N., 2003. Geomorphological explanation of swamps along the Brahmaputra River Channel, Assam: *Jour. Geological Society of India* 62, 605-613.
- Kotoky, P., Bezbaruah, D., Sarma, J.N., 2003. Erosion activity on Majuli-the largest river island in the world. *Current Science*, 84(7), 929-932.
- Sarma, J.N., Phukan, M.K., 2004. Origin and some geomorphological changes of the river island Majuli of the Brahmaputra in Assam, India. *Geomorphology* 60, 1-19.
- Sarma, J.N., 2005. Fluvial process and morphology of the Brahmaputra River in Assam, India. In: Latrubesse, E.M., Stevaux, J.C., Sinha, R. (Eds.) *Tropical Rivers, Geomorphology, Special issue, Vol.70*, pp. 226-256.
- Kotoky, P., Bezbaruah, D., Baruah, J., Sarma, J.N., 2005. Nature of bank erosion along the Brahmaputra river channel, Assam, India. *Current Science* 88(4), 634-640.
- Lahiri, S.K., Sinha, R., 2012. Tectonic controls on the morphodynamics of the Brahmaputra River system in the upper Assam valley, India, *Geomorphology* 169-170, 74-85.
- Lahiri, S.K., 2013. Laws of erosion in Majuli: A statistical approach on GIS based data, *South East Asian Journal of Sedimentary Basin Research* 1(1) (ISSN: 2320 - 6829), 80-89.
- Lahiri, S.K., Sinha, R., 2014. Morphotectonic evolution of the Majuli Island in the Brahmaputra valley of Assam, India inferred from geomorphic and geophysical analysis, *Geomorphology* 227, 101-111.
- Sarma, J.N., Acharjee, S., Murgante, B., 2015. Morphotectonics study of the Brahmaputra basin using geoinformatics, *Journal of Geological Society of India*, 86, 324-330.
- Machahary, Ratamali, 2019. Bank erosion and bankline migration of part of the Brahmaputra River from Guwahati to Jogighopa, Assam, India, *Reflection, Purbayon publications*, pp75-81 (ISBN: 978-93-88593-16-8)

- Lambert , E. T. D., Apr., 1937, *From the Brahmaputra to the Chindwin*, , *The Geographical Journal*, Vol. 89, No. 4 Hazarika Sanjoy, 2005, The Brahmaputra: muse, metaphor, source of life, , *India International Centre Quarterly*, Vol. 32, No. 2/3, Where the Sun Rises When Shadows Fall: The North-east
- Wadia, D. N. , 1942, THE SOURCES OF THE RIVERS INDUS, SUTLEJ, GANGES AND BRAHMAPUTRA, *Current Science*, Vol. 11, No. 9
- Ardussi , John A, 1977, The Quest for the Brahmaputra River and its Course According to Tibetan Sources, , *The Tibet Journal*, Vol. 2, No. 1
- Bailey , F. M, 1914, Exploration on the Tsangpo or Upper Brahmaputra, , *The Geographical Journal*, Vol. 44, No. 4 Pranavananda , Swami , Feb., 1939, The Sources of the Brahmaputra, Indus, Sutlej, and Karnali: With Notes on Manasarowar and Rakas Tal, , *The Geographical Journal*, Vol. 93, No. 2
- Goodenough , 1937, William, Dr. Hutton, Colonel Rich, Kingdon Ward, From the Brahmaputra to the Chindwin: Discussion, , *The Geographical Journal*, Vol. 89, No. 4
- Morshead , Captain , 1914, Thomas Holdich, Henry Trotter, H. J. Elwes, Exploration on the Tsangpo or upper Brahmaputra: Discussion, , *The Geographical Journal*, Vol. 44, No. 4
- Williamson Noël Williamson, 1909, The Lohit-Brahmaputra between Assam and South-Eastern Tibet, November, 1907, to January, 1908, , *The Geographical Journal*, Vol. 34, No. 4
- Waddell, L.A, 1895, The Falls of the Tsang-po (San-Pu), and Identity of That River with the Brahmaputra ,*The Geographical Journal* , Mar., 1895, Vol. 5, No. 3
- Rennell, James, 1914, *Memoir Upon the Maps of Bengal, Constructed from 1764 Onwards*, Bengal Secretariat Book Depot
- Rennell, James, 1788, *Memoir of a Map of Hindoostan or the Mogul Empire*, London