

River Morphology and Ecology (EH 602)

Introduction to River Science, Introduction to geomorphic concepts: threshold, sensitivity, connectivity, hierarchy and complexity. River basin approach: Sediment source and catchment erosion processes, Transition between hillslope and fluvial processes, Longitudinal river profiles, Sediment load and sediment yield, Sediment and nutrient transport process in rivers, Erosion and sedimentation processes in channel, Geochemical proxies to study sediment dynamics in a river basin. Drainage Network: Quantitative analysis, Role of drainage network in flux transfer, 3-dimensional connectivity in a river basin, Hydrological response of a river basin, Processes in confluence zones, Evolution of drainage network. River processes and morphology: River fluxes, energy distribution and patterns of alluvial rivers - braided, meandering and anabranching channels; Hydrological, sedimentological and ecological characteristics and their interrelationship in different channel patterns; Dynamics of alluvial rivers; Different classification approaches in fluvial geomorphology and its applications. Glacio-fluvial interaction: Sources of water in river system, Hydrological budgeting in the glaciated mountainous region, Spatial variability of glacial melt component in the Himalaya. Bedrock channels: Stream Power law and Bedrock incision process; River response to climate, tectonics and human disturbance; Quantitative analysis of bedrock channel processes and evolution of fluvial landscapes. Stream Management: Fluvial hazards and their causes, Humans and rivers, Ecosystem based approach to stream management, Concept of river health, Environmental Flow (e-flow) – definition, data requirement, different approaches for e-flow estimation.

References:

1. Bryirely and Fryirs, 2005. Geomorphology and river management. Blackwell Pub.,
2. Julien, P.Y., 2002. River Mechanics. Cambridge University Press.
3. Robert, A., 2003. River Processes: An introduction to fluvial dynamics. Arnold Publications.
4. Garde, R.J., 2006. River Morphology, New Age Publisheres.
5. Thorp, J.H, Thoms, M.C., Delong, M.D., 2008. The Riverine Ecosystem Synthesis, Academic Press.
6. Vanoni, V.A., 2006. Sedimentation Engineering. ASCE Manual, Published by American Society of Civil Engineering.