

Area: Hydraulic, Water Resources and Environmental Engineering
Level: PhD
Course title: Sediment Transport and Morphological Processes
Lecturer: M. Spasojevic
<p>Course objective: Gain theoretical background in sediment-flow interaction in alluvial rivers, study existing conceptual models and gain practical experience in modeling sedimentation processes.</p>
<p>Course outline:</p> <p><i>Course topics</i></p> <p><u>Non-cohesive sediment characteristics:</u> Overview of particular aspects of sediment and bed evolution processes. The threshold of movement. Suspended sediment and bed and near-bed sediment transport and behavior. Sediment entrainment and deposition. Sediment mixtures. Hydraulic sorting. Bed armoring. Effects on bedload flux. Etc.</p> <p><u>Overview and assesement of conceptual models of sediment transport and bed evolution</u></p> <p><u>Bed and near-bed processes:</u> The bedload-layer and the total load approach. The active-layer and active-stratum approach – sediment mixtures. One- and two-dimensional (depth-averaged) formulations.</p> <p><u>Suspended-sediment processes:</u> General three-dimensional formulation. Two-dimensional (depth-averaged) formulation. One-dimensional formulation.</p> <p><u>Sediment-exchange proceses:</u> Imposition of the near-bed concentration. Imposition of the near-bed sediment exchange.</p> <p><u>System closure and auxiliary relations:</u> The total-load approach. The bedload-layer approach. The active-layer and active-stratum approach – sediment mixtures.</p> <p><u>Brief introduction to cohesive sediment characteristics and modeling concepts</u></p> <p><i>Assignments and term projects</i></p> <p>Course topics are accompanied by assignments and term projects, requiring individual work under teacher’s guidance and supervision.</p>
<p>Recommended literature:</p> <ol style="list-style-type: none"> 1. M. Jovanovic: <i>River Hydraulics and Mophology</i>, Civil Engineering Faculty Belgrade, 2002, in Serbian. 2. M. S. Yalin: <i>Mechanics of Sediment Transport</i>, Pergamon Press Ltd., 1977. 3. W. H. Graf: <i>Hydraulics of Sediment Transport</i>, McGraw-Hill, Inc., 1971. 4. Manual 54: <i>Sedimentation Engineering</i>, Vanoni, V. A., Editor, ASCE, 1975. 5. F. M. Holly, J. C. Yang, P. Schwarz, J. Schaefer, S. H. Hsu, and R. Einhellig: CHARIMA - Numerical Simulation of Unsteady Water and Sediment Movement in Multiply Connected Networks of Mobile-Bed Channels, IIHR Report No. 343, draft addenda attached in March 1994, Iowa Institute of Hydraulic Research, The University of Iowa, Iowa City, Iowa, USA, July 1990. 6. M. Spasojevic and F. M. Holly: Two- and Three-Dimensional Numerical Simulation of Mobile-Bed Hydrodynamics and Sedimentation, Chapter 15 in <i>Sedimentation Engineering: Theories, Measurements, Modeling, and Practice</i>, ASCE Manuals and Reports of Engineering Practice No. 110, Garcia, M., ed, American Society of Civil Engineers, 2007.