

CE 524 Sediment Transport

| Credit and Contact hours | 3 / 3 (Lectures), 0 (Tutorials), 0 (Laboratory) | | | | | | | | | | |
|--|--|---------------------------------|-------------------------------|--|------------|--|------------|--|------------|--|------------|
| Required, or Elective | Elective | | | | | | | | | | |
| Course Description | This course covers basic laws governing sediment-particle fall velocity, particle-size analysis, incipient motion, bed forms, bed load, suspended load, and natural river processes. Classic and modern sediment-transport theories, sediment transport predictors, sediment yield, and reservoir sedimentation will also be discussed. | | | | | | | | | | |
| Prerequisites or Co-requisites | None | | | | | | | | | | |
| Course Learning Outcomes | <p>Students completing this course successfully will be able to:</p> <table> <thead> <tr> <th>Course Learning Outcomes (CLOs)</th><th>Related Student Outcomes (SO)</th></tr> </thead> <tbody> <tr> <td>CLO1. Discuss and explain sediment cascading and effects of human and natural change on sediment pathways. K1</td><td>SO1</td></tr> <tr> <td>CLO2. Recognize the basic concepts of sediment mechanics and sediment processes. K1</td><td>SO1</td></tr> <tr> <td>CLO3. Develop and analyze selected methods and software for estimating erosion and sediment transport rates. S1</td><td>SO2</td></tr> <tr> <td>CLO4. Perform and demonstrate the obtained results through a project, (i.e., sediment transport predictors, sediment yield, and reservoir sedimentation, as a case study). V1</td><td>SO6</td></tr> </tbody> </table> | Course Learning Outcomes (CLOs) | Related Student Outcomes (SO) | CLO1. Discuss and explain sediment cascading and effects of human and natural change on sediment pathways. K1 | SO1 | CLO2. Recognize the basic concepts of sediment mechanics and sediment processes. K1 | SO1 | CLO3. Develop and analyze selected methods and software for estimating erosion and sediment transport rates. S1 | SO2 | CLO4. Perform and demonstrate the obtained results through a project, (i.e., sediment transport predictors, sediment yield, and reservoir sedimentation, as a case study). V1 | SO6 |
| Course Learning Outcomes (CLOs) | Related Student Outcomes (SO) | | | | | | | | | | |
| CLO1. Discuss and explain sediment cascading and effects of human and natural change on sediment pathways. K1 | SO1 | | | | | | | | | | |
| CLO2. Recognize the basic concepts of sediment mechanics and sediment processes. K1 | SO1 | | | | | | | | | | |
| CLO3. Develop and analyze selected methods and software for estimating erosion and sediment transport rates. S1 | SO2 | | | | | | | | | | |
| CLO4. Perform and demonstrate the obtained results through a project, (i.e., sediment transport predictors, sediment yield, and reservoir sedimentation, as a case study). V1 | SO6 | | | | | | | | | | |
| Student Outcomes related to this Course | <p>SO 1 Recognize advanced engineering knowledge, concepts, and techniques to identify, interpret, and analyze complex and real-life engineering problems.</p> <p>SO 2 Provide solutions for complex and real-life engineering problems through critical thinking and the use of modern engineering tools, and identify their impact on social, global, cultural, environmental, safety, and economic factors.</p> <p>SO 6 Demonstrate scientific integrity, ethical responsibility, and academic values in scientific publications, research projects, and thesis work.</p> | | | | | | | | | | |

| Topics Covered | List of Topics | | Related CLOs |
|--|---|------|---------------------|
| | 1. Characteristics of sediment and sediment cascading | | CLO1,2 |
| | 2. Fluid properties; conservation laws; fluid constitutive properties | | CLO 2 |
| | 3. Soil properties and characterization relevant to erosion; rainfall and runoff | | CLO 2,3 |
| | 4. Fluid forces on particles; intro to critical shear stress; detachment and transport processes | | CLO 2,3 |
| | 5. Sheet and rill erosion; excess shear-stress; stream-power | | CLO 3 |
| | 6. Erosion control principles and structures | | CLO 3,4 |
| | 7. Gully mitigation | | CLO 3,4 |
| | 8. Sediment delivery to channels& storage | | CLO 1 |
| | 9. Open-channel hydraulics; Saint-Venant equation | | CLO 2,3 |
| | 10. Fluvial geomorphology; Lane's balance; channel evolution | | CLO 1,2 |
| | 11. Shields criteria & incipient motion; bed load transport relationships | | CLO 2 |
| | 12. Runoff routing; flow duration; hydraulic geometry | | CLO 3,4 |
| | 13. Sediment transport; composite and partitioned sediment rating curves | | CLO 3,4 |
| | 14. Storage timescales; reservoir sedimentation | | CLO 4 |
| | 15. Method to predict sediment transport process in watersheds. | | CLO 3,4 |
| Textbook(s) and Other Required Material | <ul style="list-style-type: none"> • Egashira, S. (2009): Mechanics of Sediment Transportation and River Changes. • Garcia, M., 2008, Sedimentation Engineering, ASCE manual No. 110. | | |
| Grading System | Participation and Discussions | 10% | |
| | Assignments | 25% | |
| | Mid-term exams | 25% | |
| | Final Exam | 40 % | |
| Instructors | Dr. Mohamed Elmohawis | | |
| Date of Review | March, 2025 | | |