

CIVE 716 EROSION AND SEDIMENTATION

Fall 2010 – P.Y. Julien

- Class:** Welcome to CIVE 716 03(3-0-0) Erosion and Sedimentation
- Instructor:** Pierre Y. Julien, Professor of Civil and Environmental Engineering
Engineering Research Center B205, 491-8450
Email: pierre@engr.colostate.edu
- Prerequisites:** Interest in river engineering and sediment transport.
Undergraduate courses in fluid mechanics and differential equations.
- Description:** Analysis of the interaction between fluids and solids. Mechanics of sediment transport, incipient motion, bed forms, bed load, suspended load, wash load and total load. Practical applications of sediment transport in open channels and reservoir sedimentation.
- Text:** Julien, P.Y., Erosion and Sedimentation, Cambridge University Press
<http://www.cambridge.org/us/catalogue/catalogue.asp?isbn=9780521537377>
- Topics:** Physical properties and dimensional analysis
Mechanics of sediment-laden flows
Particle motion in ideal and Newtonian fluids
Turbulent velocity profiles
Incipient motion and bed forms
Bed load, suspended load and total load
Reservoir sedimentation
- Lectures:** Monday, Wed. and Fri., 10:00-10:50 am, Room B-205 Engineering
- Office Hours:** M-W 11:00 - 12:00 room A207H on campus
Open-door afternoons at the ERC B-205
- Web-page:** The course's web page is
http://www.engr.colostate.edu/%7Eepierre/ce_old/classes/CE716/index.html
- Computer Model:** Develop computer modeling skills for flows over rigid and mobile boundaries, determine bed forms and calculate sediment loads.
- Field Trip:** Team assignment to observe and report on erosion and sedimentation features.
- Evaluation:**
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| Problem Sets (5 assignments) | 50% |
| Field Trip (team report) | 10% |
| Computer Modeling | 20% |
| Final Exam | 20% |

Approximate list of lectures

1. Syllabus
2. Fundamental Dimensions
3. Dimensional Analysis
4. Continuity
5. Buoyancy Force
6. Equations of Motion
7. Acceleration
8. Energy
9. Gradually-varied Flow
10. Inviscid Fluids – Potential Flow
11. 2-D Lift on half-cylinder
12. 3-D Lift on half-sphere
13. Force Balance – Added Mass
14. Viscous Fluids
15. Drag Force
16. Settling Velocity
17. Turbulence
18. Logarithmic Velocity Profiles
19. Smooth and Rough Boundaries
20. Angle of Repose
21. Incipient Motion
22. 3-D Particle Stability
23. Simplified Particle Stability
24. Converging Flow
25. Bedform Classification
26. Resistance to Flow
27. Dune Geometry
28. Bedload
29. Suspended Load
30. Advection-dispersion
31. Mixing Time and Length Scales
32. Concentration Profiles
33. Suspended Load
34. Total Load
35. Total Load
36. Supply-limited Sediment Transport
37. Sediment-rating Curves
38. Sedimentation
39. Life Expectancy
40. Hyperconcentrations
41. Mudflows and Debris Flows
42. Field Trip
43. Field Trip