

# CIVE 716 EROSION AND SEDIMENTATION

## Spring 2023 – Dr. 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](mailto: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, 2<sup>nd</sup> Ed., Cambridge Univ. Press  
<http://www.cambridge.org/us/catalogue/catalogue.asp?isbn=9780521537377>
- Objectives: Apply knowledge of mathematics, sciences and engineering  
Identify, analyze, formulate and solve engineering problems  
Analyze and interpret data  
Develop technical skills and advanced tools for engineering practice  
Communicate effectively and engage in team work  
Recognize the need to engage in life-long learning  
Gain knowledge of contemporary issues
- Lectures: Monday, Wed. and Fri., 11:00-11:50 am, Clark C-213
- Office Hours: MW – 10:10-10:50 in A207H Engineering  
W - 12:15-1:45 in A207H Engineering
- Web-page: The course's web page is  
[http://www.engr.colostate.edu/%7Eepierre/ce\\_old/classes/CE716/index.html](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 dispersion.
- Evaluation: Problem Sets (5 assignments) 50%  
Computer Modeling (3 assignments) 30%  
Final Exam: Thursday May 11, 4:10-6:10 pm 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. Viscous Fluids
14. Drag Force
15. Settling Velocity
16. Turbulence
17. Logarithmic Velocity Profiles
18. Smooth and Rough Boundaries
19. Velocity Profiles
20. Angle of Repose
21. Incipient Motion with Lift and Drag
22. 3-D Particle Stability
23. Converging Flow
24. Bedform Classification
25. Dune Geometry
26. Bedload
27. Suspended Load
28. Mixing Time and Length Scales
29. Advection-dispersion
30. Concentration Profiles
31. Suspended Load
32. Total Load
33. Sediment Transport Capacity
34. Sediment Capacity and Supply
35. Supply-limited Sediment Transport
36. Sediment-rating Curves
37. Sediment Sources and Yield
38. River Sedimentation
39. Reservoir Sedimentation
40. Hyperconcentrations
41. Mud flow
42. Debris Flow
43. Review