
Watershed Sciences 6900

FLUVIAL HYDRAULICS & ECOHYDRAULICS

WEEK ONE – Lecture 1

Introduction to Course & Subject

Joe Wheaton



FLUVIAL HYDRAULICS
& ECOHYDRAULICS



TODAY'S PLAN

- I. Introductions
- II. Definitions
- III. Syllabus/Expectations
- IV. Assignments



FLUVIAL HYDRAULICS
& ECOHYDRAULICS



I WANT TO KNOW

- Your math and physics background
- What you think hydraulics is...
- How you think this might relate to your research
- What you want to learn
- What you think you already know
- Modeling experience



FLUVIAL HYDRAULICS
& ECOHYDRAULICS

DEFINITIONS ALWAYS HELP TO START

hydraulics [haz 'drɔɪlɪks]

ⁿ

(Physics / General Physics) (functioning as singular) another name for [fluid mechanics](#)

Collins English Dictionary – Complete and Unabridged © HarperCollins Publishers 1991, 1994, 1998, 2000, 2003

hydraulics ^{hɪ-'drɔɪ'ɪks}

1. The scientific study of water and other liquids, in particular their behavior under the influence of mechanical forces and their related uses in engineering.
2. A mechanical device or system using hydraulic components.

The American Heritage® Science Dictionary Copyright © 2005 by Houghton Mifflin Company. Published by Houghton Mifflin Company. All rights reserved.

flu-vi-al ^(floo'vɪ-əl)

^{adj.}

1. Of, relating to, or inhabiting a river or stream.
2. Produced by the action of a river or stream.

[Middle English, from Latin *fluvialis*, from *fluvius*, river, from *fluere*, to flow; see *bhleu-* in Indo-European roots.]

The American Heritage® Dictionary of the English Language, Fourth Edition copyright ©2000 by Houghton Mifflin Company. Updated in 2009. Published by Houghton Mifflin Company. All rights reserved.

1.2 The Role of Fluvial Hydraulics

The term **fluvial** means “of, pertaining to, or inhabiting a river or stream.” This book is about **fluvial hydraulics**—the internal physics of streams. In the civil engineering context, the subject is usually called **open-channel flow**; the term “fluvial” is used here to emphasize our focus on natural streams rather than design of structures.

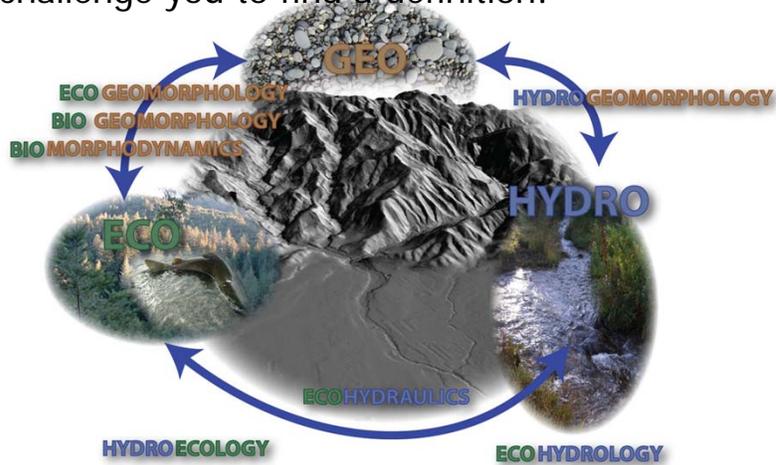
- From www.thefreedictionary.com
- From Dingman (2009)



FLUVIAL HYDRAULICS
& ECOHYDRAULICS

ECOHYDRAULICS

- I challenge you to find a definition!



- Made up word... But real discipline

HYDRAULICS IS NOT... BUT DEPENDS ON

- Climate
- Hydrology
- Geology
- Geomorphology

- What are the primary hydraulic variables?
- What are the secondary variables?

OUR HUB OF INFORMATION...



FLUVIAL HYDRAULICS & ECOHYDRAULICS
WATS 6900

Fluvial Classroom

[Home](#)

[About the Course \(Syllabus\)](#)

[Assignments](#)

[Class Announcements](#)

[Class Calendar](#)

[Course Discussion Boards](#)

[Fluvial Hydraulics Library Guide](#)

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Utah State University Links

[Department of Watershed Sciences](#)

[Banner Access](#)

[Current Students](#)

[Prospective Students](#)

[Open Course Ware](#)

Other Links

[Joe Wheaton's Website](#)

[ET-AL \(Lab\)](#)

[Links](#)

Welcome to the *Fluvial Hydraulics & Ecohydraulics* course website.

Enrolled Students:

This website is the primary distribution point of information for the course. Unlike **Blackboard**, this site will be a resource you can return to after you are done with the course.

Prospective Students

This course is being offered during spring semester 2011 as WATS 6900 (special topics). To learn more about whether this course is right for you, see the [About the Course](#) pages.



Potholes and Rills along Tromie River gorge.

Recent Announcements

Get a New Quinney Computer Lab Account

You will need a Quinney computer lab account to participate in labs. **Please do this before you come to your first lab!** Lab accounts are reset every semester. To request...

Posted Jan 4, 2011 10:21 PM by Joseph Wheaton

First Class on January 11th! Our first class will meet in the Quinney Library 204 on January 11th at 2:00. If you're considering taking the course for credit and you can't decide...

Posted Dec 3, 2010 2:42 PM by Joseph Wheaton

Showing posts 1 - 2 of 2. [View more »](#)

Homework Assignments

Reading / Homework for Thursday, January 13th

Read Skim the Preface to Dingman (2009) Read thoroughly Chapter 1: Introduction to Fluvial Hydraulics (pp 3-19) of Dingman (2009) Read: Lederer M. 2005. Ecohydraulics: A New Interdisciplinary Frontier...

Posted 23 hours ago by Joseph Wheaton

Showing posts 1 - 1 of 1. [View more »](#)



<http://fluvial.joewheaton.org>

FLUVIAL HYDRAULICS & ECOHYDRAULICS

OUR SCHEDULE -> OUR TEXT

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| WEEK 13 | Ecohydraulic Modeling | Apr 12 & 14 | Ecohydraulic Modeling (CaS/MIR) |
| WEEK 14 | Sediment Entrainment & Transport | Apr 19 & 21 | Sediment Entrainment Modeling |
| WEEK 15 | Synthesis | Apr 26 & 28 | Present Term Papers |



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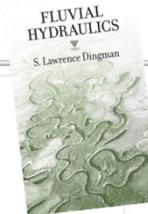


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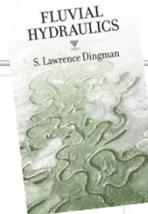


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FLUME LAB

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• Student Flume



Check out:

<http://www.neng.usu.edu/classes/cee/3500/openchannel.htm>



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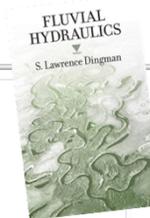
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EARN THE RIGHT TO TURN THE KNOBS

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- First six weeks building foundation in physics, fluid mechanics & hydraulics
- Make sure you understand the governing equations & how they are represented in the model
- Then focus on the technician skill of running a model



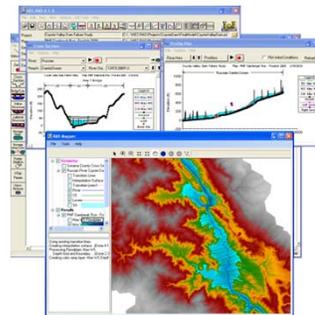
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- We'll learn HEC-RAS



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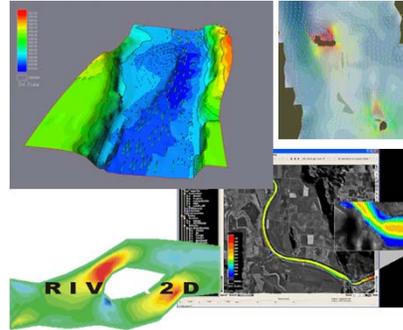
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- Other Readings...
- We'll learn IRIC (MDSWMS) or River 2D

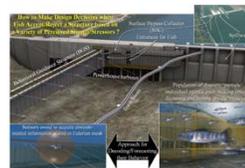
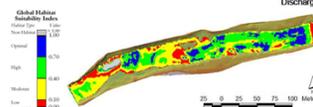
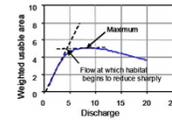


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- Other Readings...
- We'll 2D PHABSIM & CaSiMiR



From Andy Goodwin & Dave Smith (ERDC): <http://el.erc.usace.army.mil/emrrp/nfs/individualfish.htm>



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FLUVIAL HYDRAULICS
S. Lawrence Dingman



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- I'll synthesize and pull everything together...
- We'll see you present your term papers...



FLUVIAL HYDRAULICS
& ECOHYDRAULICS



WHAT IS YOUR TERM PAPER?

- A review article on the portion of the hydraulic and/or ecohydraulic literature relevant to your research
- We'll define more in about a month

THE WAY I WAS TAUGHT...

Every lecture:

- hour of monotone derivations
- no hints for solving problems
- absolutely no mention of practical utility or scientific significance



We will not
cover
everything!

Here's what we're going to experiment with:

- Lectures (50 min)
 - I will assign reading for next lecture (you need to do it first night)
 - I will choose core topics to lecture from (30 min)
 - I will post a pole on our forum, you will vote from a list of other topics to spend 10-15 minutes on
 - We will spend last 10 minutes discussing questions

LETS GO THROUGH REST OF SYLLABUS...



FLUVIAL HYDRAULICS & ECOHYDRAULICS
WATS 6900

Fluvial Classroom

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Utah State University Links

Department of Watershed Sciences

Banner Access

Current Students

Prospective Students

Open Course Ware

Other Links

Joe Wheaton's Website

ET-AL (Lab)

Links

Welcome to the *Fluvial Hydraulics & Ecohydraulics* course website.

Enrolled Students:

This website is the primary distribution point of information for the course. Unlike **Blackboard**, this site will be a resource you can return to after you are done with the course.

Prospective Students

This course is being offered during spring semester 2011 as WATS 6900 (special topics). To learn more about whether this course is right for you, see the [About the Course](#) pages.



Holes and holes along Tromie River gorge.

Recent Announcements

Get a New Quinney Computer Lab Account

You will need a Quinney computer lab account to participate in labs. **Please do this before you come to your first lab!** Lab accounts are reset every semester. To request...

Posted Jan 4, 2011 10:21 PM by Joseph Wheaton

First Class on January 11th! Our first class will meet in the Quinney Library 204 on January 11th at 2:00. If you're considering taking the course for credit and you can't decide...

Posted Dec 3, 2010 2:42 PM by Joseph Wheaton

Showing posts 1 - 2 of 2. [View more »](#)

Homework Assignments

Reading / Homework for Thursday, January 13th

Read Skim the Preface to Dingman (2009) Read thoroughly Chapter 1: Introduction to Fluvial Hydraulics (pp 3-19) of Dingman (2009) Read: Lederer M. 2005. *Ecohydraulics: A New Interdisciplinary Frontier*...

Posted 23 hours ago by Joseph Wheaton

Showing posts 1 - 1 of 1. [View more »](#)



<http://fluvial.joewheaton.org>

FLUVIAL HYDRAULICS & ECOHYDRAULICS

READING/HOMEWORK



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WATS 6900

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posted Dec 4, 2010 3:09 PM by Joseph Wheaton [updated 23 hours ago]

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- Read thoroughly Chapter 1: Introduction to Fluvial Hydraulics (pp 3-19) of Dingman (2009)
- Read: Lederer M. 2005. *Ecohydraulics: A New Interdisciplinary Frontier for CFD. Computational Fluid Dynamics*. John Wiley & Sons, Ltd, 429-460 pp. DOI: [10.1002/0470015195.ch16](https://doi.org/10.1002/0470015195.ch16)



On Thursday, we will be going on a field trip up Logan Canyon. We will be hiking in the snow (we'll provide snowshoes). If you have your own snowshoes bring them. You will need good water-proof snow boots, pants, gloves, parka and a hat. You should also bring layers. Come prepared for the snow... dress warm! Also bring something to write notes with and a camera if you've got one.

In addition to coming prepared for the elements, come ready to discuss how fluvial hydraulics differs from traditional hydraulics courses and open channel flow. Also, be prepared to discuss the review article.

Register as a user for [course discussion board](#). Post questions from reading if you have them!

Attachments (1)

 Wiley - Lederer's chapter - Final.pdf - on Jan 10, 2011 9:47 AM by Joseph Wheaton (version 1)
428k [View](#) [Download](#)



<http://fluvial.joewheaton.org>

FLUVIAL HYDRAULICS & ECOHYDRAULICS

THIS WEEK'S LAB

Lab 01 – Hydraulic Observations

- Reset what you think you know
- Just make basic observations
- Discuss Reading
- Snowshoes provided (bring food, water, and whatever you need to keep warm)
- Leave at 2:00 from NR Parking
- Return to car by dark



FLUVIAL HYDRAULICS
& ECOHYDRAULICS



NEXT LECTURE

On Tuesday:

- Lecture/Discussion on Natural Streams (i.e. Chap 2)
- Check Friday for Reading Assignment



Image from Corbis ©: <http://www.corbis.com/agev/>



FLUVIAL HYDRAULICS
& ECOHYDRAULICS



QUESTIONS??

- Post other questions to our Class Forum at <http://forum.bluezone.usu.edu/gis>

