

Fluvial Geomorphology: the Geomorphology of Streams and Rivers (version 1.0)

Fall 2016

Classroom: ENGR206

GEOL/WATS 5150/6150

Instructor: John (Jack) C. Schmidt

Office Hours

Schmidt: [L] [S] [EP] Tu, Th 2p-4p, BNR 349, jack.schmidt@usu.edu, 435-797-1791

All lecture topics are listed below, although there will be some variation as the semester proceeds. Assigned readings are listed in bold with a key to the readings at the bottom. Additional readings will be assigned as the semester proceeds

Course Fees: \$150 for field trips

[L] [S] [EP] -----

Topics Covered [L] [S] [EP]

- [1] 8/30 – Drainage basins: morphology, water in the subsurface, runoff generation, geomorphic consequences of overland flow, channel heads [**A/A: 348-377**]
- [2] 9/1 – Hydrology: flow regimes, floods, flood frequency, flow duration; open channel flow [**L: 30-55, 83-97, 110-125**]
- [3] 9/6 – Open channel flow: continuity, momentum, resistance [**A/A: 380-395; W-O**]/
- [4] 9/8 – Open channel flow: energy [**Kieffer_1985**]
- [A] 9/12 – Field lab: Measurement of cross-sections, longitudinal profiles, and back calculation of roughness: *Blacksmith Fork above UP&L's dam near Hyrum, UT (USGS gaging station 10113500)*
- [5] 9/13 – Sediment in channels; incipient motion and the Shields equation [**W: 1-5, 8-20; W-STBasic**]
- [6] 9/15 – Sediment transport concepts [**W: 24-27; W-STSediment**]
- [B] 9/19 – Field lab: Field data useful in estimating bed entrainment and bed material transport: *Cub River upstream from Franklin, ID*

- [7] 9/20 – Sediment transport concepts [**W: 20-24, 30-34; W-STFlow**]
- [8] 9/22 – Sediment transport concepts
- [9] 9/27 – Bedrock channels
- [10] 9/29 – predicting channel change using concepts in hydraulics and sediment transport: quantifying the Lane Balance [**W: 5-8; Schmidt_Wilcock_2008**]
- [11] 10/4 – Channel bed morphology: sand and gravel bedforms [**B/F: 79-82; B: 78-139; K: 187-193**]
- [12] 10/6 – Bank-attached bars in debris fan-affected channels [**Melis_2011: 17-43; Mueller_et_al_2014**]
- [D, E, F] 10/7-9 **3-DAY FIELD TRIP WEEKEND** – Field lab: Sedimentology and geomorphology of the *Green River in Grey Canyon and San Rafael River*
- [13] 10/11 – Channel bed morphology: bars [**B/F: 86-93; B: 141-147; K: 193-201**]
- [14] 10/13 -- Channel size; hydraulic geometry; effective discharge; the bankfull channel [**L: 126-147, 168-182**] [**Wolman_Miller_1960; Andrews_1980; L: 148-167**]
- [G, H] 10/15 – **SATURDAY** -- Field lab: Field determination of the bankfull channel and bankfull discharge: *Big Creek near Randolph (USGS gage 10023000)*
- [15] 10/18 – Midterm**
- 10/20 – NO CLASS (Friday class schedule)**
- [16] 10/25 -- suspended sediment transport; floodplain forms [**B/F: 108-118; B: 260-327; Li_et_al_2015; M/S: misc; D: misc**]
- [17] 10/27 – Channel planform: sinuous, single-thread channels [**B: 153-162; 181-199, 202-211**]
- [18] 11/1 – Controls on channel planform; wandering and braided rivers [**K: 230-241; B: 199-202**]
- [19] 11/3 – Longitudinal profiles at large and small scales [**Schumm_Lichty**]
- [20] 11/8 -- Channel behavior and channel change [**B/F: 17-52**]
- [21] 11/10 – Applied geomorphology and river management/restoration