Biology 147 and 240 / Earth Systems 147 and 247
Draft Course Outline

The texts for the course are Chapin et al., Principles of Terrestrial Ecosystem Ecology (CMV in the list below), and Vitousek, Nutrient Cycling and Limitation: Hawai'i as a Model System (V). Both should be available for purchase in the Bookstore, also both are on reserve in the Li and Ma science library. An electronic version of CMV is accessible to Stanford users through the library.

Contact me any time by email (vitousek@stanford.edu), including to set up a meeting in my office (Y2E2 375) or online via zoom.

The class meets Tuesday and Thursday from 10:30 to 11:50 in Green Earth Sciences 150

Generally, I will lecture Tuesdays; most Thursdays, we will discuss a set of publications. Most of these publications are listed below and will be on canvas; more may be added later. One or more (depending on enrolment) of you will organize and lead each discussion, with my help and advice. The exceptions to the course plan are that there will be lectures on Thursday Sept 23 and Thursday Sept 30, and a discussion on Tuesday Sept 28; I will lead that discussion. For all discussions, I request a two-paragraph summary of one of the papers assigned by the beginning of class – what the paper says, and what you got out of it. Students will be assigned to a paper, and will participate in leading the discussion of that paper.

The course will be offered both as an undergraduate and a graduate course, in both Biology and Earth Systems. For graduate credit, enroll in Bio 240 or ES 247; you will be expected to write a paper (likely on an area in which you lead a discussion).

There will be a midterm exam and a final; both will be take-home, open book, no time limit tests. In addition, your contribution to class will be assessed.

I intend to teach this course as an advanced course. To me that means it should a demanding course – one for which you won't always have the background, and for which you may have to go and get that background (with my help and advice). It also means a flexible and interactive course – one for which the outline below is more a set of suggestions than a firm program. If our interests keep us on a topic for a few days, fine; if we follow our interests into other topics, that's fine too. While it is an advanced course, dedicated undergraduates should be able to do very well.

September 21	Introduction – The Ecosystem Approach	CMV Ch 1, V Ch 1
Sept 23	Soils	CMV Ch 3
Sept 28	Discussion on soils	Chadwick and Chorover 2001 Richter and Yaalon 2012, Vitousek and Chadwick 2013 Slessarev et al. 2016

Sept. 30	Plants and Primary Production	CMV Ch 5, 6
Oct 5	Decomposition and nutrient dynamics	CMV Ch 7
Oct 7	Short lecture on Isotopes and food webs, then Discussion Consumers and Regulation,	Hairston et al. 1960, Polis 1999, Allison 2006
Oct 12	Element inputs: Weathering and atmospheric deposition	V. Ch 6
Oct 14	Discussion on N Fixation	Vitousek and Field 1999, Menge and Levin 2008, Menge et al. 2009, Vitousek et al. 2013
Oct 19-21	Take Home Midterm	
Oct 26	Element Cycling – Acquisition, efficiency, stoichiometry, transformations, absorption, feedbacks	CMV Ch 8, 9; V Ch 4,5, 8np 160-177
Oct 28	Discussion remote sensing and biogeochemistry	Asner et al. 2004, Chadwick and Asner 2016
November 2	Election day (University Holiday)	
Nov. 4	Discussion Element cycling - efficiency	Vitousek 1982, Roberts 2008, Berendse and Aerts 1987
Nov. 9	Element Losses –leaching and volatilization	V Ch 7
Nov. 11	Discussion species and ecosystems	CMV Ch 11, V Ch 8 177-188 Ehrenfeld 2003, Hughes and Denslow 2005
Nov. 16	Social/environmental systems	CMV Ch 15
Nov. 18	Discussion – models and modeling	Parton et al. 1987, Vitousek et al. 2021, Maher and Chamberlain 2014
Nov 30	The geography of biogeochemistry	
Dec. 2	Discussion Agriculture and Biogeochemistry	Robertson et al. 2000, Robertson and Vitousek 2009, Vitousek et al. 2009, Chen et al. 2014
Dec. 6-12.	Take Home Final Exam	