

January 20, 2015

## **Advances in Ecological Modeling (BIOE 516)**

(T 14:00-16:00, Th lab 14:00-15:00, 122 AJMJ)

**Instructor:** Dr. Ben Poulter

**Office Hours:** 9-11 am Thursday, or by appointment, 111 AJM Johnson Hall

**Contact:** benjamin.poulter@montana.edu

**Course D2L Website:** none – papers are all available online. We'll set up a Windows VM for the lab assignment.

**Course Objectives:** Ecological modeling has been challenged by how to represent the billions of trees on the planet by a computer model. This seminar course starts with the first forest model and brings us through to the current state of art in vegetation modeling. The focus on the course is on theory of how to represent forest structure, emphasizing scaling assumptions and implications.

**Textbook:** All the reading are from the primary literature – see the last page for the readings of the course.

**Course Format:** This course is mainly discussion based. We have 1 guest speaker, 1 field trip to Hyalite, and 2 computer labs.

**Attendance:** Your attendance is mandatory – please see me if you will be absent or miss a class to discuss on how to catch up on the topic.

**What to expect:** This will be a relatively fast paced course that will take students through multiple interdisciplinary concepts related to ecosystem modeling. Students should be motivated to stay engaged and think critically about the work and especially how it relates to their research interests.

**Academic Misconduct (from Dr. Hu's course description):** MSU Policy - academic honesty and integrity are fundamental to the mission of higher education. The University has a responsibility to promote academic honesty and integrity and to assure the highest ethical and professional standards and behavior in the classroom. MSU has developed procedures that address instances of academic dishonesty, and students who violate these standards are subject to academic and/or disciplinary sanctions. Sanctions range from a simple verbal reprimand (disrupting class) to separation from the University, and/or withdrawal of an academic degree (cheating/plagiarism).

**Special needs (from Dr. Hu's course description):** If you have a documented disability for which you are or may be requesting an accommodation(s), you are encouraged to contact me and the Disabled Student Services as soon as possible. I wish to fully include persons with disabilities in this course. It is in your best interest if you inform me as soon as possible regarding any special accommodations in the curriculum, instruction, or assessments of this course that may be necessary to enable you to fully participate in this course.

**Grading:** Participation is 100% of your grade. This includes reading the papers, asking questions, and leading 2-3 classes during the semester.

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**CLASS SCHEDULE**

Week	Date	Day of Week	Topic	Assignments
1	1/15/14	Thurs	Overview, from gap to global models	
	1/20/14	Tues	The challenge → size structured models	<b>LM3v</b> intro (Weng et al., 2014)
2	1/22/14	Thurs	The perfect plasticity assumption	<b>LM3V</b> method (Weng et al., 2014) <b>PPA</b> (Purves et al., 2007)
	1/27/14	Tues	Linking PPA, ED, and allocation	<b>LM3V</b> finish (Weng et al., 2014)
3	1/29/14	Thurs	A closer look at physiological scaling	<b>LM3V</b> app. B (Weng et al., 2014)
	2/03/14	Tues	The gap model	<b>JABOWA</b> (Botkin et al., 1972) <b>FORET</b> (Shugart and West, 1977) <b>FORCLIM</b> (Bugmann, 1996)
4	2/05/14	Thurs	The gap model	<i>Review #1</i> (Bugmann et al., 1996) <i>Review #2</i> (Bugmann, 2001)
	2/10/14	Tues	Process-based gap models	<b>FORSKA 1</b> (Leemans and Prentice, 1987) <b>FORKSA 2</b> (Prentice and Leemans, 1990)
5	2/12/14	Thurs	Process-based gap models	<b>FORSKA 3</b> (Prentice et al., 1993) <b>BIOME</b> (Prentice et al., 1992)
	2/17/14	Tues	Individual based models	<b>BIOME 3</b> (Haxeltine and Prentice, 1996) <b>LPJ-GUESS</b> (Smith et al., 2001)
6	2/19/14	Thurs	Spatially explicit models	<b>ZELIG</b> (Urban et al., 1991) <b>HYBRID</b> (Friend et al., 1993) <b>SEIB</b> (Sato et al., 2007)
	2/24/14	Tues	Spatially explicit models	<b>SORTIE</b> (Pacala et al., 1996)
7	2/26/14	Thurs	Spatially explicit models	<b>SORTIE</b> (Pacala et al., 1996)
	3/03/14	Tues	LPJ-GUESS educational tool	<b>LPJ-GUESS</b> (Smith et al., 2001)
8	3/05/14	Thurs	LPJ-GUESS educational tool	<b>LPJ-GUESS</b> (Smith et al., 2001)
	3/10/14	Tues	<b>No Class</b>	
9	3/12/14	Thurs	<b>No Class</b>	
	3/17/14	Tues	Physiology scaling review (light/water)	<b>PGAP</b> (Haverd et al., 2012) <b>Radiation</b> (De Pury and Farquhar, 1997) <b>APP B4</b> (Weng et al., 2014)
10	3/19/14	Thurs	Approximations	<b>DISCFORM</b> (Lischke et al., 1998)
	3/24/14	Tues	Approximations	Primer 1 and Chap 15 Of Otto and Day <b>ED</b> (Moorcroft et al., 2001)
11	3/26/14	Thurs	Approximations	<b>ED</b> (Moorcroft et al., 2001)
	3/31/14	Tues	Approximations	<b>ED2</b> (Medvigy et al., 2009)
12	4/02/14	Thurs	PPA revisited	<b>Shell</b> (Mitchell, 1975)
	4/07/14	Tues	PPA revisited	<b>PPA</b> (Strigul et al., 2008)
13	4/09/14	Thurs	PPA revisited	<b>PPA</b> (Purves et al., 2008)
	4/14/14	Tues	Field trip to Hyalite Canyon	<b>Self-thinning</b> (Adler, 1996) <b>Dhote Rule</b> (Bellassen et al., 2010)
14	4/16/14	Thurs	Competition for light and water	<b>Competition</b> (Farrior et al., 2013)
	4/21/14	Tues	DGVMS – convert to differential equations	<b>JULES-TRIFFID</b> (Cox) <b>LPJ</b> (Sitch et al., 2003) <b>CTEM</b> (Melton and Arora, 2013)
15	4/23/14	Thurs	DGVM modules	<b>CABLE</b> (Haverd et al., 2014b)

				<b>CABLE</b> (Haverd et al., 2014a)
	4/28/14	Tues	DGVM challenges	Review (Quillet et al., 2010)
16	4/30/14	Thurs	Rosie Fisher Skype	Review (Fisher et al., 2010)

## References

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