

FOREST ECOLOGY AND MANAGEMENT – FALL 2019
SCHOOL FOR ENVIRONMENT AND SUSTAINABILITY
UNIVERSITY OF MICHIGAN

COURSE No.: EAS/ ENVIRON 447 - FOREST ECOLOGY AND MANAGEMENT

INSTRUCTOR: Inés Ibáñez
Dana 2546
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OFFICE HOURS: Tuesdays 12-2 pm (Dana 2546)

GSI: Ben Lee
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MEETING TIMES: Lectures- Tuesday & Thursday 11:00 am – 12 pm, Dana 1024
Labs - Wednesday 12-4 pm, Saginaw forest & Dana 1024
Thursday 12-4 pm, Saginaw forest & Dana 3556

COURSE DESCRIPTION:

In this course, we will use ecological concepts as they apply to forests in the context of current forest ecological research and forest management. We will study the biological and ecological basis behind the current challenges forest ecosystems face under global change (i.e., climate change, landscape fragmentation, pollution, introduced species). We will also review the role and impact of humans on these communities, focusing on the services forests ecosystems provide and the emergence of urban ecology.

Labs will consist of field trips to Saginaw forest during the first half of semester and computer labs during the second half. Data collected in the field will be processed in the lab and analyzed during the computer labs. Field labs will focus on learning various sampling designs and data collection techniques. Computer labs will focus on the implementation of basic statistical analysis and models in R to the analysis of field data. The lab exercises will involve assessment of forest biodiversity, estimation of tree species biomass and demographic parameters, and measurement of forest carbon pools.

For graduate students enrolled, there will be a course assignment aimed at developing a forest research or management plan. In this assignment students will apply the concepts reviewed in both lecture and lab to real world problems.

COURSE OBJECTIVES:

By the end of course, students will have an understanding of the concepts, components, mechanisms and processes that shape forests, and will be able to apply this knowledge to a variety of contexts (e.g., management, recreation, conservation, research). In addition, students will have gained skills in reading comprehension, synthesis, scientific presentation, field techniques, and basic modeling skills.

PREREQUISITES:

Students taking this course are expected to have a background in general ecology and have mastered the basic principles in ecology.

CLASS SCHEDULE

<i>Day</i>	<i>Topic</i>
September 3	BASIC CONCEPTS Course introduction Forests ecosystems (Boreal, Temperate, Tropical and Managed forest) I
September 5	Forests ecosystems (Boreal, Temperate, Tropical and Managed forest) II
September 10	Sampling design. Evaluating forest conditions I
September 12	Evaluating forest conditions II
September 17	Forest Soils I
September 19	Forest Soils II
September 24	Energy and nutrients-biogeochemical cycling
September 26	Energy and nutrients-primary production and allocation
October 1	FOREST DISTURBANCES Disturbances: Pests, Pathogens, Wind and Fire I
October 3	Disturbances: Pests, Pathogens, Wind and Fire II
October 8	Disturbances: Pests, Pathogens, Wind and Fire III
October 10	Succession and gap dynamics Using natural disturbance dynamics in management
October 15	FALL BREAK
October 17	MANAGEMENT Forest biodiversity, an ecological indicator.
October 22	Preserving ecosystem integrity and Sustainable management

October 24	Midterm exam
October 29	Natural regeneration after harvesting and Forest Restoration
October 31	Forest Degradation, Deforestation, REDD+
November 5	Wildlife management in forest ecosystems
November 7	GLOBAL CHANGE Climate change I
November 12	Climate change II
November 14	Landscape Fragmentation
November 19	Pollution
November 21	Invasive species
November 26	Urban Forests
November 28	THANKSGIVING
December 3	FOREST MODELS Forest Models - LANDIS
December 5	Graduate Students Presentations
December 10	Final Exam First Date* Management/Research plan due (graduate students only)
December 17	Final Exam Second Date* 4:00-5:00 pm

*Final exam will be offered at two different dates, December 10 and 17, students can choose which day to take it.

LAB SCHEDULE

*Saginaw Forest: http://www.snre.umich.edu/facilities/saginaw_forest

<i>Day</i>	<i>Topic</i>
September 4,6	LAB: No lab this week
September 11,12	LAB 1*: <i>Getting to know our study site - Saginaw Forest Experimental and sampling design</i>

September 18,19	LAB 2*: <i>Diversity survey</i>
September 25,26	LAB 3*: <i>Forest structure and composition</i>
October 2,3	LAB 4*: <i>Stand measurements</i>
October 9,10	LAB 5*: <i>Carbon estimates I</i>
October 16,17	LAB 6*: <i>Carbon estimates II</i>
October 23,24	LAB 7*: <i>Growth and yield</i>
October 30,31	LAB 8: <i>Analysis of Diversity Data</i>
November 6,7	<i>Forest Stewardship Plan Writing Workshop by Mike Smalligan (DNR) –Starting at 1 pm.</i>
November 13,14	LAB 9: <i>Stand summary: structure, age, spatial arrangement, productivity</i>
November 20,21	LAB 10: <i>Carbon estimates</i>
November 28,29	THANKSGIVING
December 4,5	LAB 11: <i>Growth and forecasting productivity</i>

ACADEMIC ACCOMMODATIONS

If you need any particular accommodations for a disability please let your instructors and Services for Students with Disabilities (SSD) know, we will work to the best of our abilities to address your needs. Any information provided will be treated as confidential.

DIVERSITY, EQUITY AND INCLUSION

This course abides to the UM policies and procedures on Diversity, Equity and Inclusion, which can be found at <http://diversity.umich.edu>.

GRADING

Grading will be based on class participation, lab reports, a midterm exam and a final exam. For graduate students grading will also account for a management/research report and an oral presentation on the report.

<i>Undergraduate students</i>		<i>Graduate students</i>	
class participation	10%	class participation	10%
lab reports	30%	lab reports	20%
midterm exam	25%	midterm exam	15%
final exam	35%	final exam	20%

management/research plan	25%
oral presentation	10%

-Grade assignment:

95.1-100	A+
90-95	A
88-89.99	A-
86-87.99	B+
80-85.99	B
78-79.99	B-
76-77.99	C+
70-75.99	C
68-69.99	C-
66-67.99	D+
60-65.99	D
58-59.99	D-
<=57.99	F

-Class participation: students' questions and comments are encouraged during the lectures and after the oral presentations. Class participation includes attendance and knowledge of the assigned lecture readings and the submission of presentations feedback.

- The management/research plan will reflect real-world situations and students will have to use the theoretical and applied concepts reviewed during the lectures and labs to develop a research project or a management plan. **Management/research plans will be due on: December 10.** Late assignments will be penalized with a 10% grade reduction for each hour the report is late.

- Graduate students are expected to give an individual oral presentation, ~2-5minutes, on their management/research plans. A week before the start of the presentations we will review the guidelines for presenting management/research plans.

- Lab materials will be posted the Friday before the lab period. Lab reports will due a week from the end of the lab.

-Late assignment policy: assignments submitted after the deadline will be penalized with 10% of the grade for each hour late. After 10 hours assignments will still be accepted to provide feedback but they will not be graded.

HONOR CODE

All students are expected to abide to the University of Michigan SEAS Honor Code. Plagiarism will result in direct failure of the course. Plagiarism includes: 1) the direct use of any written material (e.g., books, journals, internet) without proper quotations and citation or 2) the submission of a document, in part or wholly authored by someone other than the student.

REFERENCE MATERIAL

- Avery, T.E. and Burkhart, H.E. 2002. Forest Measurements. McGraw-Hill.
- Bardgett, R.D. and Wardle, D.A. 2010. Aboveground-belowground linkages. Oxford University Press, Oxford. ISBN: 978-0-19-954688-6
- Barnes, B. V., Zak, D.R., Denton, S.R. and Spurr, S.H. 1998. Forest Ecology – 4th Edition. John Wiley and Sons, Inc. New York, NY. ISBN: 0-471-30822-6
- Bettinger, P., Boston, K., Siry, J.P. and Grebner, D.L. 2009. Forest Management and Planning. Elsevier, Amsterdam.
- Clout, M.N. and Williams, P.A. (eds.) 2009. Invasive Species Management. Oxford University Press, New York, NY. ISBN: 978-0-19-921633-8
- Coomes, D.A., Burslem, D. F.R.P. and Simonson, W.D. 2014. Forests and Global Change. Cambridge University Press, New York. ISBN 978-1-107-61480-2
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- Dickmann, D.I. and Leefer, L.A. 2003. The forests of Michigan. The University of Michigan Press, Ann Arbor. ISBN: 0-472-06816-4
- Forman, R.T.T. 2014. Urban Ecology: Science of Cities. Cambridge University Press, Cambridge. ISBN: 978-0-521-18824-1.
- Kimmens, J.P. 2004. Forest Ecology: a foundation for sustainable management – 3rd Edition. Prentice Hall. Upper Saddle River, NJ. ISBN: 0-02-364071-5
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- Lucka M. and Godbold D.L. 2011. Soil Ecology in Northern Forests. Cambridge University Press, Cambridge. ISBN: 978-0-521-71421.

Marzluff, J.M. et al. (eds.) 2008. Urban Ecology. Springer, New York, NY. ISBN: 978-0-38-773411-8

McEvoy, T.J. 2004. Positive Impact Forestry. Island Press, Washington, D.C.

Newton, A.C. 2007. Forest ecology and conservation. Oxford University Press, Oxford. ISBN: 978-0-19-856745-5

Peh, K., Corlet, R. and Begeron, Y. (Edtors). 2015. Routledge handbook of forest ecology. Routledge, New York. ISBN: 978-0-415-73545

Perry, D.A. 1994. Forest Ecosystems. The Johns Hopkins University Press, Baltimore. ISBN: 0-8018-4987-X

Ruxton, G.D. and Colegrave, N. 2006. Experimental design for the life sciences. Oxford University Press, Oxford. ISBN: 978-0-19-956912-0

Smith, D.M., Larson, B.C., Kelty, M.J. and Ashton, P.M.S. 1997. The practice of siculture: applied forest ecology. John Wiley & Sons, Inc. New York.

Thomas, P.A. and Packham, J.R. 2007. Ecology of woodlands and forests. Cambridge University Press. Cambridge, UK. ISBN: 978-0-521-54231-9

Turner, M.G., Gardner, R.H. and O'Neill, R.V. 2001. Landscape Ecology: in theory and practice, pattern and process. Springer, New York.

Villard, M-A., Jonsson, B.G. (eds.) 2009. Setting Conservation Targets for Managed Forest Landscapes. Cambridge University Press, New York, NY. ISBN: 978-0-521-70072-6

Warning, R.H. and Running, S.W. 2007. Forests Ecosystems – 3rd Edition. Elsevier Academic Press. San Diego, CA. ISBN: 978-0-12-370605-8

LINKS TO GUIDES ON FOREST MANAGEMENT PLANS

Michigan: http://www.michigan.gov/dnr/0,4570,7-153-30301_30505_62551---,00.html

Private owners: <http://www.forestasyst.org/managementplan.html>

Florida:

http://sfrc.ufl.edu/extension/florida_forestry_information/forest_management/plan.html

Utah: http://extension.usu.edu/files/publications/publication/NR_FF_003.pdf

Oregon: <http://outreach.oregonstate.edu/programs/forestry/oregon-forest-management-planning>

Urban: <http://www.sandiego.gov/planning/programs/urbanforest/index.shtml>

Urban: <http://treepittsburgh.org/urban-forest-master-plan>