

Syllabus

Forestry 360:

Forest Ecosystems, Carbon and Climate Change

Online Course

General Course Information

Meeting time, location:	An asynchronous online course offered through Desire2Learn
Credits:	3
Open to:	Majors and Non-majors in Forestry
Prerequisites:	None
Professor:	David L. Skole Manly Miles 101 Department of Forestry skole@msu.edu 355-1778
Office Hours:	Fridays 12:40-2:00PM, or by appointment

Course Description

This class introduces students from many majors and disciplines to the concept of forest ecosystem analysis and measurement, with a focus on policy and science of the global carbon cycle and climate change. We shall take a special interest in examining the role forest ecosystems play in the global climate through emissions and sequestration of greenhouse gases, especially carbon dioxide. Forest ecosystems cover most of the natural landscapes of the planet, from savannas to rainforests. They are directly used as an important natural resource and support the livelihoods of more than 1.6 billion people. They are also valuable for their ecosystem services, which provide regulation of climate, food, supplies of important feedstocks and materials, water quality, cultural amenities and more.

Since 2015 forests have been highlighted as a significant component of climate change mitigation and adaptation policies and strategies. Hence, the focus of this course will be on international aspects of forests, the services they provide, and their influence on global-scale environmental issues. We will explore how society's use of forest ecosystems can be both detrimental and beneficial. We shall also look at agroforestry systems and other systems of Trees Outside of Forests in agriculture because of their importance to economic development and linkages to issues such as poverty alleviation. We will focus on the basic underlying science and the relevant policy and economic aspects. The course covers the basic science of climate change as well as the emerging policy response including the international convention on climate change. In addition, the course introduces students to carbon markets, carbon finance and economics, and to concepts of environment and development.

Course Learning Approach

Most major problems in the world require an ability to think across disciplines. Outside of the classroom, we rarely meet a problem or find a solution to a problem that is based on a single disciplinary background of knowledge. Thus, by focusing on a theme or problem through the lenses of multiple disciplines, we can create a productive learning approach. In this course students are introduced to basic principles of forest ecology, which is elaborated with a focus on how these principles apply to climate change. Also, because many students enrolled in this course may come from the social sciences we make sure that students understand the human dimensions of this global issue as well as the technical, but we shall approach the topic using empirical and quantitative approaches. One key aspect is an introduction to carbon cycle science as it relates to land change science. An important part of the course is demonstrating methods for measuring carbon and greenhouse gases in forests, because emissions from deforestation and forest degradation are the second most important forcing of climate change. We will discuss large scale remote sensing methods and technologies, as well as field-based measurement methods. Some introduction to economic and finance analysis, especially through the lens of Ecosystem Services will also be provided. Students will thus have an interdisciplinary grasp of the basic concept, as well as a few practical skills. Lastly, the course transcends just a focus on a problem, and delves into finding *solutions*, of which there are many, including policy measures (e.g. REDD+), to provide a positive and forward-looking framework for understanding global climate change.

Course Learning Objectives

This course is intended for majors in Forestry and non-majors. Learners from across the university are welcome and the content is suitable for a range of students. There is some emphasis on conveying scientific methods and concepts, but the main aim is to expose all learners to the approach that science takes to describing, assessing, and understanding the world. The course also exposes all learners to interdisciplinary concepts, which includes the social sciences as well as biological/physical sciences.

Students should be better able to:

- Describe the interplay between forests and the atmosphere, including effects of forests and forest disturbances such as deforestation on climate change.
- Apply economic and financial theories and tools to demonstrate the economic feasibility of forest interventions to mitigate climate change.
- Explain how climate change regulatory frameworks shape forest resource conservation and management practices and decision-making.
- Analyze tree and forest data to summarize current forest conditions, carbon stocks and greenhouse gas emissions.

- Analyze and understand sociological processes that influence forest-related climate change decision-making and mitigation.
- Understand how to Apply contemporary technologies in forest monitoring.
- Discriminate between ideas that do and do not constitute proper subjects for science, give examples of how scientific understanding itself constantly evolves, and be able to use scientific approaches to solving problems in the natural world.

Course Format

This course is delivered entirely online through the course management system *Desire 2 Learn*. You should already be set up for D2L if you have registered for the course. In *Desire2Learn*, you will access online lessons, course materials, and additional resources. Activities will consist of background readings, online lectures and short writing assignments. *This course is mostly asynchronous, meaning that there is not a set time when everyone needs to be online for course activities.*

The course is set up in Modules, each lasting approximately one to two weeks in which the student needs to do the readings and view the online lectures. There are three sections to the course: 1) Basics of Climate Change and Forests, 2) Moving to Solutions and Climate Change Policy, and 3) Forest Carbon Monitoring and Climate Change Mitigation. Each section has 4-5 Modules on specific topics.

At the end of each Section the student is expected to turn in a *Completion Assignment (CA)* before going to the next Section of modules. Please contact the instructor well ahead of time if you foresee any problems with the timing of course activities. Students are not penalized for late submission of Completion Assignments; the only requirement is that all CA's are turned in by the close of the semester. Each Completion Assignment will be a 5 page (approximate) short paper prepared by the student based on the assignment given by the instructor.

Generally, each Module is opened at the beginning of the week, and is left open for the duration of the semester. Notices are posted on D2L when a Module is opened, and an email notice is sent.

How to Complete the Course.

This is an asynchronous on-line course. This means that the course does not have a specified meeting time and learners shall work mostly at your own pace. Approximately every week students work on a Module, viewing lectures, and doing readings. There is also a video Blog which is added for interest, where the instructor posts comments or opinions on matters related to Forests and Climate Change. Sometimes the Blog is a current report from the field in different parts of the world by the Professor or his colleagues.

The Modules are listed in the Syllabus below. They will be opened in sequence approximately each week. They will stay open for the entire course. At the end of several Modules for each Section of the course, there will be a Completion Assignment (CA), which is also found on-line. I will place the CA online just before you start the next section. The CA is to be completed independently by the student and turned in through a Drop Box also found online in the Module.

The instructor evaluates each CA after it is turned in. He will determine if it is satisfactory or unsatisfactory. If it is unsatisfactory the learner will be notified to re-work it according to instructor suggestions. The CAs are not lengthy nor difficult; rather they are used to help learners evaluate your own progress and so the instructor can certify that learners have done the Module Assignments. Most conscientious students never have problems. When learners have satisfactorily completed all CAs they have completed bulk of the course.

Textbooks and On-Line Resources

The course shall also be using the book, *Dire Predictions*, by Michael Mann and Lee Kump as an option. It is very good and learners benefit from this off line material. This book can be obtained from several outlets online, and costs run \$15-\$25. Please order this book on your own. The instructor has provided a link to the Amazon listing for learners' reference in D2L.

The citation for this book is:

Mann, M.E and L.R. Kump. 2015. *Dire Predictions: Understanding Global Warming. The illustrated guide to the findings of the IPCC.* 2nd Edition. DK and Pearson Education.

The remainder of content and resources for this course are provided through D2L.

How to Use the Online Content: Tips for easy access to content.

There are 12 modules in this course, and they are listed below. Learners access the materials and content for each module through D2L. In each module learners are provided three types of content: 1) online lectures, 2) readings and 3) a video blog entry. In addition to the online content, learners are expected to purchase a textbook, which is referenced above. Learners are required to read, view and know all content.

The **online lectures** are provided in two formats. The first is a MS Powerpoint Presentation with voice over audio, which can be downloaded and viewed off line. Learners *must* download the PPT file, and play it in Slide Show mode on their own computer. In Slide Show mode, the presentation advances on its own. If one wishes to step through the presentation, take it out of Slide Show mode and access each slide manually. There is an embedded audio control which allows one to advance it as they wish.

In addition to the PPT file, as a way to provide access to other devices than a computer, there is a streaming video of the online lecture. The streaming video is stored in the MSU Kaltura Media

space. Access to each streaming video is provided by a link (URL) that is on D2L. Click on the link and the video will play. You can control the video using slider bar.

Occasionally there are problems or technical issues with devices or versions of software, or the provision of the content is different than previous content you experienced in this course. If there are any playback issues please do not hesitate to contact the professor directly.

All **readings** are provided on D2L in digital formats, PDF for documents, Links for web sites, etc.

The **Blog** is an occasional “report from the field”, as a short video piece in which the professor discusses or presents a supplemental topic related to the course. This is only available in streaming video format and a link is provided in D2L. These occasional reports are meant to add time for topics that might be interesting for discussion. Thus, occasionally, the instructor may post a question for discussion in the Blog, for which there is a Discussion Forum where the instructor can engage the class in various “conversations”, and where the students can discuss the topic(s).

Instructions for each Module are found below in this Syllabus.

The Completion Assignments (CA) are provided in D2L at the end of each Section. The CA is provided as a document. You turn your CA in using a Dropbox that is provided on D2L. Acceptable formats for CAs are only Word and PDF.

News and Announcements

The professor will regularly post announcements in D2L, and it is important to check in with D2L regularly to stay current with any new announcements.

Exams and Grading

There are no Exams. There will not be a final Exam. There will be three Completion Assignments. Each one is in the form of a written short paper on a topic that is assigned. Each is worth 30% of your grade. Turning in 3 CAs is a 4.0 grade for the course. Turning in 2 CAs is a 2.0 and turning in 1 or none is a 0.0. I reserve an additional 10% for occasional miscellaneous assignments other than the CA.

Course Schedule

Week	Module	Topic	Readings	Online Content
Section 1: Basics and Climate Change and Forests				
1	Preface to the Course	A general overview of the current state of knowledge on climate change.	None assigned	Online Lectures
	<i>Instructions</i>	View the video introduction to the course and the video introduction to the Section. View the Online Lectures.		
	<i>Blog Entry</i>	View the Welcome video, located in the General Information module.		
2	Lines of Evidence for Climate Change	An overview of how science knows climate change is happening and the role of humans. We use the booklet from the National Academy of Sciences (NAS), and the associated video series.	a) Start reading <i>Dire Predictions</i> Part 1. b) Read the NAS booklet, in D2L.	Online link to National Academy of Sciences video series.
	<i>Instructions</i>	Start the reading Part 1 of DP. Read the NAS booklet, which is placed in D2L. Watch the entire NAS video series, which is linked in D2L.		
	<i>Blog Entry</i>	Watch the video interview with Dr. Skole, link in D2L.		
3	The Climate System and Climate Change	An overview of the global climate system, how it works and how it is disrupted by Greenhouse Gases. The Greenhouse Effect.	Dire Predictions, Part 1	Online Lectures
	<i>Instructions</i>	Continue reading Part 1 of DP, view the online lectures in D2L.		
	<i>Blog Entry</i>	None this week		
4	Forests and the Global Carbon Cycle	A review of forests of the world, some basic concepts on forest ecosystems, and the global carbon cycle with a focus on the biota	Dire Predictions, Part 1	Online Lectures
	<i>Instructions</i>	Finish readings of Part 1 of DP and view the online lectures in D2L.		
	<i>Blog Entry</i>	Watch the video Blog 2: <i>Forests are Life, reporting from India</i>		
5	Case Study: the Carbon2Markets Model at MSU	An overview of the MSU model that links climate change mitigation to poverty alleviation and economic development in forest-dependent countries.	None Assigned	Online Lectures
	<i>Instructions</i>	There is no new readings assigned, but make sure you are caught up on		

		DP, Part 1. View the Online Lectures		
	<i>Blog Entry</i>	Watch the video Blog 3: <i>Kenya Kasigau Corridor Project</i>		
Completion Assignment 1 Available on D2L				
Section 2: Moving to Solutions and Climate Change Policy				
6	Climate Change Policy	An overview of the international efforts to mitigate climate change, and the major activities related to forests.	Dire Predictions, Part 2	Online Lectures
	<i>Instructions</i>	Work on the Completion Assignment 1. Start reading Part 2 of DP. View the online lectures		
	<i>Blog Entry</i>	None this week		
7	Global Deforestation and Forest Degradation	An overview of the problem of tropical deforestation, its drivers and causes and its effects on climate change	Dire Predictions, Part 3	Online Lectures
	<i>Instructions</i>	Read Part 3 of DP. View the online lectures		
	<i>Blog Entry</i>	None this week		
8	Reducing Deforestation and Forest Degradation	A look at the new international agreements on forests to reduce emissions from deforestation and halt tropical deforestation. Will include international protocols for measuring carbon.	Dire Predictions, Part 3	Online Lectures
	<i>Instructions</i>	Continue reading Part 3 of DP. View the online lectures		
	<i>Blog Entry</i>	None this week		
9	Carbon Markets and Carbon Finance	A review of the basic concepts of reporting carbon offsets in forestry and creating market mechanisms for trading carbon credits. Reviews cap and trade mechanisms.	Dire Predictions, Part 3	Online Lectures
	<i>Instructions</i>	Finish Part 3 of PD. View the online lectures		
	<i>Blog Entry</i>	None this week		
Completion Assignment 2 available on D2L				
Section 3: Forest Carbon Monitoring and Climate Change Mitigation				
10	Monitoring Deforestation and Forest Cover	A review of technical methods for forest monitoring, using remote sensing and other approaches. Includes trees outside of forests in agriculture, and agroforestry systems.	None Assigned	Online Lectures
	<i>Instructions</i>	View the online lectures.		
	<i>Blog Entry</i>	None this week		

11	Case Study: Implementing REDD+ in Malawi	A review of a complete REDD+ project in African	None Assigned	Online Lectures
	<i>Instructions</i>	View the online lectures		
	<i>Blog Entry</i>	None this week		
12	Activity Data and Emissions Factors	A review of the basic methods for measuring carbon stocks in forests and woodlands	None Assigned	Online Lectures
	<i>Instructions</i>	View the online lectures		
	<i>Blog Entry</i>	None this week		
13	Social Data, Community Based Measurement, Mitigation Interventions	A broad review of the use of social data, engaging communities in the process of measuring their carbon, and forest landscape restoration	Dire Predictions. Part 5 (skip Part 4)	Online Lectures
	<i>Instructions</i>	Start reading Part 5 of DP. View the online lectures.		
	<i>Blog Entry</i>	Watch the video Blog 4: Community based carbon monitoring in Indonesia		
14	Capacity Building and Finding Solutions	A review of building new capacity to measure, monitor and report carbon emissions in forests, and solutions to deforestation and forest degradation	Dire Predictions, Part 5	Online Lectures
	<i>Instructions</i>	Finish reading Part 5 of DP. View the online lectures		
	<i>Blog Entry</i>	None this week		
Completion Assignment available on D2L.				

Student Expectations

There is a full participation policy in place for this course. This means students are expected to come to every class fully prepared to take the lectures or participate in class activities. Students are expected to do the assigned readings prior to class, and are expected to engage in outside readings of the newspapers, magazines and other outlets for current affairs. There is an in-class etiquette policy that is strictly enforced, that includes the following prohibitions: no readings of newspapers, e-readers or other forms of electronic text transmission, no talking or eating or drinking, no working on other assignments or other activities (e.g. reading email) that is a distraction from your full attention in class.

Full Respect for Divergent Views and Expressions of Ideas

The class will strictly adhere to a policy of mutual respect for each other, each other's ideas, and views. You are encouraged to take issue with any content or ideas presented in class, but you are

required to respect opposing viewpoints, ideas and preferences. I expect each student to consider him/herself as a member of an academic community and as such strive to push ideas and concepts as far as they might go but in a healthy and open mode of discourse

MSU Policies

Office of Institutional Equity (OIE): <https://oie.msu.edu/>

The Office of Institutional Equity (OIE) review concerns related to discrimination and harassment based on age, color, gender, gender identity, disability status, height, marital status, national origin, political persuasion, race, religion, sexual orientation, veteran status, and weight under the University's Anti-Discrimination Policy (ADP: <https://oie.msu.edu/resources/adp-resources.html>) and Policy on Relationship Violence and Sexual Misconduct (RVSM: <https://oie.msu.edu/resources/rvsm-resources.html>). OIE staff is available to provide information on the policies, connect MSU community members to resources, investigate complaints, and provide training.

Mandatory Reporting Policy

"Michigan State University is committed to fostering a culture of caring and respect that is free of relationship violence and sexual misconduct, and to ensuring that all affected individuals have access to services. For information on reporting options, confidential advocacy and support resources, university policies and procedures, or how to make a difference on campus, visit the Title IX website at www.titleix.msu.edu."

Trigger Warning

During this semester, we may discuss historical or current events that may be disturbing or even traumatizing to some students. If you suspect that the material is likely to be emotionally challenging for you, please discuss your concerns with me prior to the class in which the subject comes up. Similarly, if we are discussing something in class and you feel the need to step outside during a class discussion, you may always do so without academic penalty. You will be responsible for getting the material from a classmate or see me individually to discuss the situation.

Limits to Confidentiality

Essays, journals, and other materials submitted for this class are generally considered confidential pursuant to the University's student record policies. However, students should be aware that University employees, including instructors, may not be able to maintain confidentiality when it conflicts with their responsibility to report certain issues based on external legal obligations or that relate to the health and safety of MSU community members and others. As the instructor, I must report the following information to other University offices if you share it with me:

- (a) Suspected child abuse/neglect, even if this maltreatment happened when you were a child,
- (b) Allegations of sexual assault or sexual harassment when they involve MSU students, faculty, or staff, and
- (c) Credible threats of harm to oneself or to others.

- (i) *These reports may trigger contact from a campus official who will want to talk with you about the incident that you have shared. In almost all cases, it will be your decision whether you wish to speak with that individual. If you would like to talk about these events in a more confidential setting you are encouraged to make an appointment with the MSU Counseling Center.*

The Spartan Code of Honor: Academic Pledge

Michigan State University affirms the principle that all individuals associated with the academic community have a responsibility for establishing, maintaining, and fostering an understanding and appreciation for academic integrity. Academic integrity is the foundation for university success. Learning how to express original ideas, cite works, work independently, and report results accurately and honestly are skills that carry students beyond their academic career.

The Spartan Code of Honor Academic Pledge embodies the principles of academic integrity through a personal commitment to ethical behavior in a student's studies and research. All undergraduate students are expected to uphold the academic pledge throughout their enrollment at MSU. Student conduct that is inconsistent with the academic pledge is addressed through existing policies, regulations, and ordinances governing academic honesty and integrity. Those policies include:

- [Integrity of Scholarships and Grades Policy](#)
- [Student Rights and Responsibilities](#)
- [General Student Regulations \(includes Protection of Scholarship and Grades\)](#)
- [Ordinance 17.00 Examinations](#)

Students are encouraged to review the following websites to learn more about academic integrity, student rights and responsibilities, and the Spartan Code of Honor:

- Spartan Life Handbook (Student Affairs)
- [University Ombudsperson](#)
- [ASMSU](#)

The Spartan Code of Honor was adopted by ASMSU on March 3, 2016, endorsed by Academic Governance on March 22, 2016, and recognized by the Provost, President, and Board of Trustees on April 15, 2016.

The Spartan Code of Honor Academic Pledge:

“As a Spartan, I will strive to uphold values of the highest ethical standard. I will practice honesty in my work, foster honesty in my peers, and take pride in knowing that honor in ownership is worth more than grades. I will carry these values beyond my time as a student at Michigan State University, continuing the endeavor to build personal integrity in all that I do.”

Plagiarism Policy

“Plagiarism is copying another person's text or ideas and passing the copied material as your own work. You must both delineate (i.e., separate and identify) the copied text from your text and give credit to (i.e., cite the source) the source of the copied text to avoid accusations of plagiarism. Plagiarism is considered fraud and has potentially harsh consequences including loss of job, loss of reputation, and the assignation of reduced or failing grade in the course”. See web

site for definition and helpful links regarding what constitutes plagiarism:
<https://ombud.msu.edu/academic-integrity/plagiarism-policy.html>