FOREST ECOSYSTEMS & MANAGEMENT
## ERS 234
Course Outline: September 2017

"Sadly, its much easier to create a desert than a forest" – James Lovelock

COURSE DESCRIPTION

This course examines the fundamental concepts of forest ecology and the role of forests in terrestrial ecosystems. The course will be divided into three sections, and will integrate case studies to introduce the student to current research problems in the study of forest ecology. Section I: People and Forests evaluates the impact of humans and a growing population on forest ecosystems. The dependence of humans on forest resources and the development of forestry and forestry practices will be discussed. Section II: Transfer, Cycling and Interactions of Energy and Nutrients will discuss the concept of ecosystems and its emergent properties, the transfer, storage and allocation of energy and nutrients (carbon, nitrogen, phosphorus etc.) and the effects of humans on these forest cycles. Interactions include the effects of solar radiation, temperature, water, wind, fire and soil on forest ecosystem productivity and diversity. Section III: Forest Management focuses on conventional and sustainable forest management practices, forest plantations, forest fragmentation, biodiversity and climate change. This course is available on D2L (Learn).

Course Concept Map
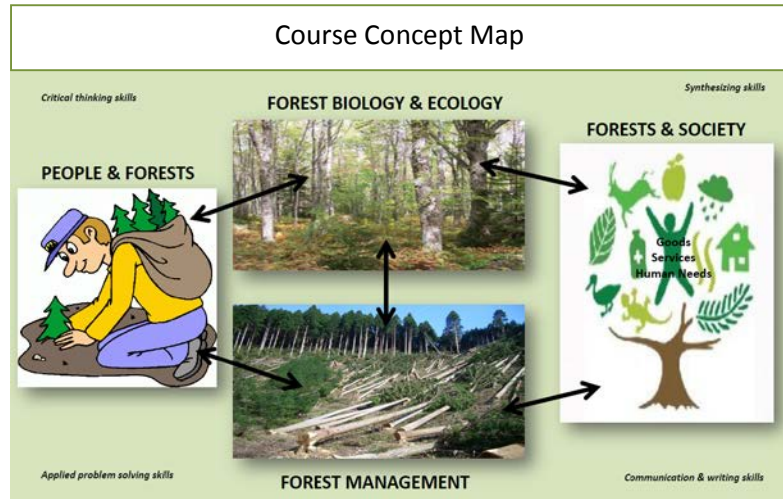
COURSE GOAL & INTENDED LEARNING OUTCOMES

Goal:

- To introduce the fundamental concepts of forest biology and ecology, and forest management; and to introduce the major factors that lead to the interaction between people, society and forests and the development of policies for forest conservation.

Learning Outcomes:

1. People and Forests
   - Understand the fundamental issues to forest degradation that led to policy development in Canada and the USA to protect forest ecosystems

2. Forest Biology & Ecology
   - Identify different forest biomes of the world and recognize different forest landscapes and watershed management approaches

- Understand forest ecophysiology
- Describe forest soils and their importance in forest ecosystem ecology

3. Forest Management
   - Wildlife, fire, measuring & monitoring, silvicultural practice
   - Understand wildlife and forest ecosystem interactions
   - Understand the positive and negative roles of fire in forest ecosystems
   - Explain how to measure and monitor forest resources
   - Describe different forest management (silvicultural) techniques

4. Forests & Society
   - Describe what is social forestry and current issues in social forestry

COURSE MEETING TIMES & LOCATION

Lecture Times	Location
Tuesday from 8:30 am to 11:20 am	EV3 - 3412

INSTRUCTIONAL TEAM

	PROFESSOR	*TEACHING ASSISTANT*
NAME	**Prof. Dr. M. Oelbermann**	**TBD**
CONTACT INFORMATION	**Office: EV-2, room 2008** **E-mail: moelbermann@uwaterloo.ca** **Phone: 519-888-4567 Ext. 37552**	**Office:** **E-mail:** **Phone:**
OFFICE HOURS	**TBD**	**TBD**

MATERIALS
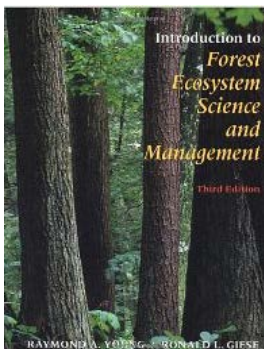
This textbook is available in the UW Bookstore:
Strongly Recommended
Raymond A. Young and Ronald L. Giese. Introduction to Forest Ecosystem Science and Management, 3rd Edition.

Additional *(but not required for the course)* readings to supplement the textbook will be available on Learn. These readings will be relevant to the material discussed in class; help with the assignment and provide further insight for interested students.

COURSE ASSESSMENT

LEARNING OUTCOME	ASSESSMENT METHODS (FORMATIVE & SUMMATIVE)	% OF OVERALL GRADE	TEACHING & LEARNING METHODS

1. **People & Forests**
2. **Forest Biology & Ecology**
	• Class discussions
	• Midterm
	  ▪ Lectures 1 – 4
	  ▪ Held in class
		0
		30
			• Interactive lectures
			• Case studies
			• Video presentation
			• Textbook readings
			• Course website
			• PowerPoint slides

3. **Forest Management** 4. **Forests & Society**	• Class discussions • Assignment (see assignment outline) • Final Exam (not cumulative) • Lectures 5 – 11	0 30 40	• Interactive lectures • Case studies • Video presentation • Textbook readings • Course website • PowerPoint slides

SUMMARIZED SCHEDULE OF COURSE ACTIVITIES

MODULE #	DAY OF LECTURE	LECTURE #	TOPIC	READING MATERIAL
1. **PEOPLE & FORESTS**	Sept. 12, 2017	1	- Introduction - Forest ecosystem sustainability	Introduction Chapter 1
2. **FOREST BIOLOGY & ECOLOGY**	Sept. 19, 2017	2	- Forest biomes of the world **- DVD: Seasonal Forests**	Chapter 2
	Sept. 26, 2017	3	- Landscape ecology & watershed management	Chapter 7 Chapter 16
	Oct. 3, 2017	4	- Forest ecophysiology	Chapter 4
	Oct. 10, 2017	--	**- Reading Break (no class)**	--
	Oct. 12, 2017	5	- Forest soils	Chapter 5
	Oct. 17, 2017	**--**	**- Midterm (in class start at 8:30 am)**	
	Oct. 24, 2017	6	- Forest ecosystem ecology **- DVD: Climbing Redwood Giants**	Chapter 6
3. **FOREST MANAGEMENT**	Oct. 31, 2017	7	- Forest wildlife management **- Video: The Great Bear Rainforest**	Chapter 14
	Nov. 7, 2017	8	- Forest fires **- Assignment due (submit via Learn)**	Chapter 18
	Nov. 14, 2017	9	- Measuring & monitoring forest resources	Chapter 11
	Nov. 21, 2017	10	- Silviculture - Ecosystem management	Chapter 13 Chapter 19
4. **FORESTS & SOCIETY**	Dec.28, 2017	11	- Social forestry **- DVD: Agroforestry**	Chapter 23

DETAILED SCHEDULE OF COURSE ACTIVITIES

MODULE I: PEOPLE AND FORESTS

LECTURE 1

Introduction

- Introduction to ERS 234: Forest Ecosystems and Management
- Course outline
- Course expectations

Sustainability of Forest Ecosystems (Introduction & Chapter 1)

- Introduction to forest ecosystem science and management
- Forest policy development in the USA
- Forest policy development in Canada

MODULE 2: FOREST BIOLOGY AND ECOLOGY

LECTURE 2

Forest Biomes of the World (Chapter 2)

- Factors affecting vegetation distribution
- Forest biomes
- Canadian forest ecozones
- Global change and forests

LECTURE 3

Landscape Ecology and Watershed Management (Chapter 7 & 16)

- Introduction
- Landscape patterns and their generation
- Influence of landscape patterns on forest ecosystems
- The watershed concept
- The hydrological cycle
- Global distribution of terrestrial water
- Integrated watershed management

LECTURE 4

Forest Ecophysiology (Chapter 4)

- Tree structure and function
- Environmental stresses
- Global issues in forest ecophysiology

LECTURE 5

Forest Soils (Chapter 5)

- Concept of forest soil & properties of forest soils
- Nutrient distribution and cycling in forest ecosystems
- Forest soils and tree nutrition

- Soil survey and classification
- Forest soils and environmental quality

LECTURE 6

Forest Ecosystem Ecology (Chapter 6)

- Concepts in systems ecology
- Forest tree species distribution
- The carbon cycle and forest growth
- The nutrient cycle
- Forest succession
- Effects of timber harvesting on forest ecosystems

MODULE 3: FOREST MANAGEMENT

LECTURE 7

Forest Wildlife Management (Chapter 14)

- Ecological interactions
- Wildlife as components of forest ecosystems
- Wildlife effects on forests
- Effects of forest management on wildlife
- Wildlife considerations in ecosystem management

LECTURE 8

Forest Fires (Chapter 18)

- Natural fire regimes
- Human influence on forest fire
- Fire behavior
- Fire prevention, control & prescribed burning
- Environmental Impacts of Forest Fires

LECTURE 9

Measuring and Monitoring Forest Resources (Chapter 11)

- Measurement of primary forest products
- Survey and mapping
- Measuring forest resources with a focus on timber
- Measurement of non-timber resources

LECTURES 10

Silviculture and Ecosystem Management (Chapters 13 & 19)

- Evolution of silvicultural practices
- Natural patterns of disturbance
- Growth and development of forest stands
- Treatments to improve existing stands
- Regeneration of forest stands
- Silvicultural systems
- Silvicultural practices and ecosystem integrity

- Ecological Forest Management (EFM)
- Timber harvesting techniques (Chapter 19)

MODULE 4: FORESTS AND SOCIETY

LECTURE 11
Social Forestry (Chapter 23)
- Global experience in social forestry
- Issues and challenges in social forestry
- Final exam review

DESCRIPTION OF DVDs

Seasonal Forests (BBC's Planet Earth)
Trees are earth's largest organisms and are also one of the planet's oldest inhabitants. Seasonal forests (unlike tropical rain-forest) the largest land habitats. A third of all trees grow in the endless taiga of the Arctic north. Northern America has forests that include California's sequoia's, the earth's largest trees. There and elsewhere, their vast production of photosynthesis and shade presides over a seasonal cycle of life and involves countless plant and animal species. *Written by KGF Vissers*

Climbing Redwood Giants (National Geographic)
They are giants—stretching more than 300 feet above the ground, with hidden gardens and mysterious predators thriving within their canopy. National Geographic reveals the unexplored environment of redwoods using high-tech aerial laser surveys and breathtaking imagery. Obsessive redwood climber Steve Sillett of Humboldt State University investigates their monster crowns, tallying biological material and discovering new record-breaking trees, while escaping falling branches and crashing trees in the process. Down below, National Geographic Explorer-in-Residence Mike Fay charts the redwood range. It is an epic yearlong exploration to size up the past and future of this primeval tree threatened in 21st century California.

STUDENT CONDUCT AND APPROPRIATE BEHAVIOUR

I encourage students to study together, however each student is expected to individually fulfill the requirements of the assignment, presentation, and exams. It is the responsibility of each student to be aware of what constitutes responsible behaviour in class, what constitutes plagiarism, and your rights and responsibilities with respect to these issues.

Academic Integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. www.uwaterloo.ca/academicintegrity/. Students who are unsure what constitutes an academic offence are requested to visit the on-line tutorial at: http://www.lib.uwaterloo.ca/ait/

Note for students with disabilities: The Office for Persons with Disabilities (OPD), located in Needles Hall, Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the OPD at the beginning of each academic term.

Grievance: A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70 - Student Petitions and Grievances, Section 4, www.adm.uwaterloo.ca/infosec/Policies/policy70.htm.

When in doubt, please contact your Undergraduate Advisor for details.

Discipline*:* A student is expected to know what constitutes academic integrity, to avoid committing academic offence, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offense, or who needs help in learning how to avoid offenses (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course professor, academic advisor, or the Undergraduate Associate Dean. For information on categories of offences and types of penalties, students should refer to Policy 71, Student Discipline, www.adm.uwaterloo.ca/infosec/Policies/policy71.htm. For typical penalties, check Guidelines for Assessment of Penalties, www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm

Appeals: A decision made or penalty imposed under Policy 70 - Student Petitions and Grievances (other than a petition) or Policy 71 – (Student Discipline) may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72 (Student Appeals). See: www.adm.uwaterloo.ca/infosec/Policies/policy72.htm

Consequences of Academic Offences:
ENV students are strongly encouraged to review the material provided by the university's Academic Integrity office (see: http://uwaterloo.ca/academicintegrity/Students/index.html).