

Simon Fraser University
School of Resource and Environmental Management
Applied Population and Community Ecology

Instructor: Dr. Anne Salomon
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Office hours: by appointment

Lectures: Tuesday 10:30am – 12:20pm (SECB Rm 1011)
 Friday 12:30am – 2:20pm (SECB Rm 1011)

Course Overview

This course explores the scientific foundations of applied ecology and highlights contemporary conservation strategies designed to balance the needs of people and nature. We will explore topics such as metapopulation theory and reserve design, alternative states and resilience, and ecosystem function and ecosystem-based management. Course readings will include textbook chapters to provide students with the foundations of applied ecology, and cutting-edge, peer-reviewed literature to expose students to the latest innovations in the field of conservation science. Students will also have the opportunity to apply field and modelling approaches to real-world conservation issues. Half and full day field trips to local conservancies and parks will allow students to develop practical field research skills. Finally, classroom sessions will engage students in lively group discussions and will include lectures, hands-on analysis, guest speakers, and group work on current and contentious topics in conservation science.

Overall Class Goals

As new and aspiring graduate students, my aim is to facilitate your development of the skills and knowledge you will need to excel in the field of environmental management and conservation, whether you are interested in an academic career or in doing science-based conservation at government agencies, non-governmental organizations, or international institutions. This class has been designed to hone your creative and critical thinking skills, enhance your communication and debating ability, and expose you to a diverse set of problem solving techniques. I encourage you to challenge current dogma and explore the intersections between applied ecology, your own personal academic interests, and the diversity of fields you will be exposed to at REM.

Overall Learning Outcomes

By the end of this course, you will be able to:

1. Identify and synthesize the core principles of ecology that should be considered while addressing an environmental issue

2. Understand the key processes that drive ecosystem dynamics and their associated uncertainties
3. Communicate complex and/or contentious ecological information clearly and effectively to a target audience
4. Work independently and collaboratively on contemporary environmental problems to formulate and implement solutions

Required Textbook

Kareiva, P. and Marvier, M. 2014. Conservation Science; Balancing the Needs of People and Nature. Roberts and Company. Greenwood Village, Colorado. Second Edition. (available at the Burnaby Campus bookstore)

Field Trips

Fri, Sept 25th (3 hrs):

- Light House Park: Marine Protected Area Design and Analysis
- 8:00am-11:00am (To catch the low tide)
- 801 will switch to REM 611's 12:30-2:20pm time slot (check with Dr. Karen Kohfeld for details)

Sat, Oct 24th (7 hrs - full day):

- Lower-Seymour Conservation Reserve: Ecosystem-based Management of Temperate Rainforests
- 9:00am- 4:00pm

No Class

Tu, Sept 15th:

- Reading for 'Future of Conservation' Debate

Fri, Oct 16th

- Compensation for Lower-Seymour Field Trip

Fri, Nov 6th

- Compensation for Lower-Seymour Field Trip

Fri, Nov 20th

- Compensation for Lower-Seymour Field Trip

Modules

Module 1: Reserve Design

Part I: An Introduction to Reserve & Protected Area Science

Part II: Island Biogeography & the SLOSS Debate

Part III: Metapopulations & Source Sink Dynamics

Module 2: Ecosystem Services

Part I: Biodiversity, Productivity, Ecosystem Function

Part II: Ecosystem Services Valuation and Critique

Module 3: Ecosystem-Based Management

Part I: Biotic Processes, Competition, Predation, Trophic Cascades and Shifting Baselines

Part II: Abiotic Drivers, Temperate Rainforests, Ecosystem-Based Management

Module 4: Managing for Resilience

Part I: Introduction to Resilience and Alternative State Dynamics

Part II: Adaptive Cycle, Rigidity Traps, Gilded Traps

Module 5: Imperiled Species and Populations Dynamics

Part I: Allee Effects and Exponential Growth Models

Part II: Matrix Models, Population Viability Analysis and Choosing Conservation Actions

Module 6: Global Challenges and Solutions

Part I: Feeding the Planet; Land Conversion, Food Security and Global Climate Change

Part II: Biotic Homogenization; Ecological Consequences of Introduced Species

Evaluation and GradingIndividual Assignments **(20)**

- *Worksheets (10)*
- *Short oral presentation & critical summary of peer-reviewed journal articles (point - counterpoint critiques & debates) (10)*

2 Group Projects **(40)**

- *Marine Reserve Design, Assessment and Feasibility (20)*
- *Ecosystem-Based Management in Temperate Rainforests (20)*

2 Exams **(35)**

- *Midterm Exam (15)*
- *Final Exam (20)*

Class Participation **(5)**

- *Active participation in class dialogues, posing questions, catalysing discussions*
- *Enthusiastic participation in field trips*
- *Being present and on time for lectures and field trips*

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T: 10:30am-12:20pm F: 12:30-2:20pm Rm SECB (**unless otherwise noted)

Week	Date	Topic	Required Reading
1	Tu, Sept 8	Introduction to Course Course Overview & Goals Learning Outcomes & Course Mechanics How 611 Fits Within REM Program	none
1	Fri, Sept 11	Introduction to Applied Ecology & Conservation Human Alteration of Earth's Ecosystems Assign Journal Articles	Kareiva and Marvier 2012 Bioscience Ch. 1
2	Tu, Sept 15***	Class off Read papers & Ch. for Fri, Sept 18th	Read papers & Ch. for Fri, Sept 18th
2	Fri, Sept 18	The Future of Conservation Debate <i>Module 1: Reserve Design</i> Part I: Introduction to Reserves & Protected Areas Introduction to Light House Park & Begin Brainstorming Marine Reserve Group Project	Doak et al. 2014a TREE Critique Marvier and Kareiva 2014 TREE Response Doak et al. 2014b TREE Reply Tallis & Lubchenco 2014 Nature Critique Ch. 5 Ch. 6

3	Tu, Sept 22	<p><i>Module 1: Reserve Design</i> Part II: Island Biogeography & SLOSS Debate</p> <p>Refine Questions & Field Methods for Marine Reserve Group Project</p>	<p>McClanahan 2015 J Biogeography http://phys.org/news/2015-09-coral-reefs-fish-safeguarding.html Ch. 10 276-286p Ch. 15</p>
3	Fri, Sept 25***	<p>Field Trip to Light House Park: Marine Protected Area Design and Analysis 8:00am-11:30am</p>	<p>Note: 801 will switch to 12:30-2:20pm (check with Dr. Karen Kohfeld for details)</p>
4	Tu, Sept 29	<p>Light House Park Debrief Stats in a Nutshell Preparing Manuscripts for Publication</p> <p><i>Module 1: Reserve Design</i> Part III: Metapopulations & Source Sink Dynamics</p>	<p>Hopf et al. 2015 Eco Apps preprint Ch. 10 287-296p</p>
4	Fri, Oct 2	<p><i>Module 2: Ecosystem Services</i> Part I: Biodiversity, Productivity, Ecosystem Function</p> <p>Debate on the Use of Conservation Markets</p>	<p>Essington & Criddle 2014 Eco Apps Gerber et al. 2014a Eco Apps Smith et al. 2014 Eco Apps Critique Gerber et al. 2014 b Eco Apps Reply Ch. 3</p>
5	Tu, Oct 6	<p><i>Module 2: Ecosystem Services</i></p>	<p>Curran et al. 2014 Eco Apps</p>

		Part II: Ecosystem Services and Critique Debate on the Use of Biodiversity Offsets	Quetier et al. 2015 Eco Apps Critique Curran et al. Eco Apps 2015 Reply
5	Fri, Oct 9	Class Presentations of Group Project # 1: Marine Reserve Design, Feasibility and Assessment	none
6	Tu, Oct 13	Mid-term Exam Mid-term Course Evaluation	Review previous required readings
6	Fri, Oct 16***	Class off (Compensation for Lower-Seymour Field Trip)	none
7	Tu, Oct 20	<i>Module 3: Ecosystem-Based Management</i> Part I: Biotic Processes; Competition, Predation & Facilitation, Trophic Structure, Trophic Cascades & Shifting Baselines	Ferretti et al. 2015 Frontiers Ch. 11 319-320 Ch. 15 432-433
7	Fri, Oct 23	<i>Module 3: Ecosystem-Based Management</i> Part II: Abiotic Processes; Temperate Rainforest EBM Prep for Field Trip & EBM Group Project	Duveneck and Scheller Eco Apps 2015 Ch. 13
7	Sat, Oct 24***	Field Trip to Lower Seymour Conservation Area: Ecosystem-Based Management	See Assignment

8	Tu, Oct 27	Field Trip Debrief Enter and Plot Data, Begin Analysis Scope out Project Paper & Talk	none
8	Fri, Oct 30	<i>Module 4: Managing for Resilience</i> Part I: Introduction to Resilience and Alternative States Functional Responses, Hysteresis	Selkoe et al. 2015 Eco Health & Sus
9	Tu, Nov 3	<i>Module 4: Managing for Resilience</i> Part II: Adaptive Cycle, Rigidity traps, Gilded traps	Schultz et al. 2015 PNAS
9	Fri, Nov 6***	Class Off (Compensation for Lower-Seymour Field Trip)	none
10	Tu, Nov 10	Group Project #2 Presentations on Temperate Rainforest EBM	none
10	Fri, Nov 13	<i>Module 5: Imperilled Species and Populations Dynamics</i> Part I: Allee Effects and Exponential Growth Models	Kuparinen et al. 2014 Cons Bio Ch. 7

		Minimum viable population size	Ch. 8
11	Tu, Nov 17	<i>Module 5: Imperilled Species and Population Dynamics</i> Part II: Matrix Models, Population Viability Analysis and Choosing Conservation Actions	Stringell et al. 2015 Bio Conservation Ch. 9
11	Fri, Nov 20	Class off (Compensation for Lower-Seymour Field Trip)	none
12	Tu, Nov 24	<i>Module 6: Global Challenges and Solutions</i> Part I: Feeding the Planet; Land Conversion, Food Security and Global Climate Change	Johnson et al. 2014 PNAS Ch. 14
12	Fri, Nov 27	<i>Module 6: Global Challenges and Solutions</i> Part II: Biotic Homogenization; Ecological Consequences of Introduced Species Invasional meltdown	Lampert et al. 2014 Science Ch. 17
13	Tu, Dec 1	Course Review & Synthesis Course Evaluations	Come with Clarifying Questions
13	Fri, Dec 4	Final Take Home Exam Due Dec 4 th by Midnight	none