

Rainforests of Australia

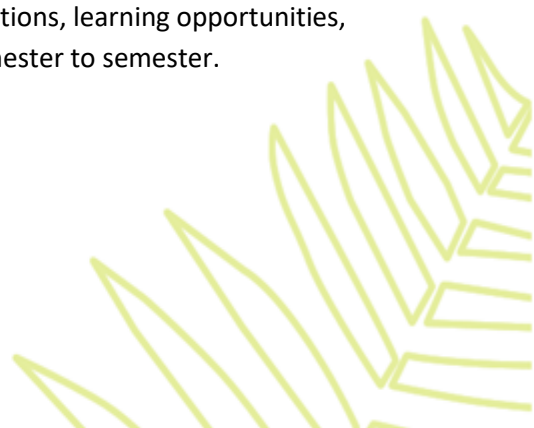
SFS 3262

Syllabus
4 credits

The School for Field Studies (SFS)
Center for Rainforest Studies (CRS)

Queensland, Australia

This syllabus may develop or change over time based on local conditions, learning opportunities, and faculty expertise. Course content may vary from semester to semester.



COURSE CONTENT SUBJECT TO CHANGE

Please note that this is a copy of a recent syllabus. A final syllabus will be provided to students on the first day of academic programming.

SFS programs are different from other travel or study abroad programs. Each iteration of a program is unique and often cannot be implemented exactly as planned for a variety of reasons. There are factors which, although monitored closely, are beyond our control. For example:

- Changes in access to or expiration or change in terms of permits to the highly regulated and sensitive environments in which we work;
- Changes in social/political conditions or tenuous weather situations/natural disasters may require changes to sites or plans, often with little notice;
- Some aspects of programs depend on the current faculty team as well as the goodwill and generosity of individuals, communities, and institutions which lend support.

Please be advised that these or other variables may require changes before or during the program. Part of the SFS experience is adapting to changing conditions and overcoming the obstacles that they may present. In other words, this is a field program, and the field can change.

Center Research Direction

The Centre for Rainforest Studies' research plan addresses the question: How can the future of the Wet Tropics in a changing world be ensured? Staff and students of SFS-CRS investigate this topic by engaging in research under three core components:

1. Understanding ecological and social systems;
2. Conflict, vulnerability and change;
3. Effective response to change.

Through our research, we aim to assist a range of stakeholders and research partners. These include local landholders; non-government conservation organisations conducting rainforest restoration or having a special interest in flora and fauna; several levels of government, particularly local and state government; regional research organisations, including universities and the Commonwealth Scientific and Industrial Research Organisation.

We aim to improve stability, sustainability, environmental awareness, and concern for natural resources in the Wet Tropics, in particular on the Atherton Tablelands. Our goal is to strengthen research, technical and practical collaboration between SFS-CRS and other research organizations, governmental agencies, and non-governmental organizations to carry out this agenda.

Course Overview

In Rainforests to Australia, you will obtain a broad appreciation of the diversity and dynamics of tropical terrestrial biomes and marine life. You will be introduced to the current and past distributions of tropical rainforests, their biodiversity, and their relationships with the abiotic environment, human use, present threats, and restoration practices. This course aims to bring together an understanding of the underlying ecological processes that affect rainforests (and other tropical vegetation) with the role of human society in shaping the present and future rainforests of the Wet Tropics. The course will take the Australian Wet Tropics as a case study to investigate this field, yet many of the skills you learn here can be transferred to other systems. Topics covered will include: biophysical determinants of which vegetation type occurs where; past, present, and future threats to Wet Tropics rainforests; and the theory and practice of rainforest restoration.

The course also has a practical component. You will be taught field techniques for carrying out field research, data analysis, and communication of results.

The course is a mixture of class lectures, field lectures, field laboratory courses, workshops, field trips, and readings to complement the material presented in the lectures. A major emphasis is on field skills, the collection, management and analyses of data, and skills of writing a scientific paper. A wide range of material will be provided and should be used to study the class topics and to acquire the desired skills. Be aware that all material covered in class, lectures, field lectures, and field trips.

Learning Objectives

Following this course, students should have an understanding of:

1. the factors that influenced the origin of the Wet Tropics rainforests and its flora and fauna;
2. the ecology of rainforest and associated ecosystems in the Wet Tropics Bioregion;
3. the threats to these ecosystems and the GBR in Australia and the impacts these may have on ecological processes;
4. restoring terrestrial and marine ecosystems

Themes

The Rainforests of Australia course is divided into two themes.

The first theme is used to give you a background in the processes that shaped the rainforests, freshwater and marine ecosystems of the Wet Tropics and gives you an insight in how these ecosystems work. With this understanding, the human impacts on the Wet Tropics are put into an ecological context. In short, this half is designed to familiarize you with the various ecosystems of the Wet Tropics and how humans have affected them.

The second theme puts you into the role as a “researcher” and attempts to train you to have a plethora of skills in academic ecological research. As such, we conduct extensive field exercise activities to provide a critically evaluation of the different techniques used today to try and mitigate the threats to these ecosystems in a most effective way.

Assessment

Most of the assessments will be based on individually written or orally presented work. Below is a table of the assessments for this course.

Assessment Item	Value (%)
Biodiversity Assignment	20
Field Exercises	35
Three-minute Talk	10
Plant ID Quiz	10
Final Exam	20
Participation	5
TOTAL	100

Biodiversity Assignment (20%)

This assignment brings you back to the basics. Good science is good observation. Good observations come with good notes. The greatest scientists in the fields of natural science such as botany and zoology are known for their careful collections of specimens and meticulous notes. This assignment is done as a group and aims to give you a keen appreciation of this fundamental practice of making biological collections and observation recording. Your observations will also contribute towards a local and global database.

Field Exercises (35%)

We will construct a profile of a forest using data collected in the field. This includes setting up plots to sample vegetation and measuring and identifying plants. Other field exercises involve measuring plant functional traits and studying community level attributes of terrestrial vegetation systems. By going through these exercises, you will learn valuable skills in setting up research plots. You will also learn to analyze and interpret data you collect from your study plots during the course. In this assignment you will be required to submit a profile diagram that you will construct from your own data and write a short report that presents and interprets the data you collect. Peer review contributes towards your grade in this assignment.

Three-minute Talk (10%)

This individually assessed three-minute talk provide an opportunity to practice your presentation skills and learn about important topics in rainforest ecology and conservation.

Plant ID Quiz (10%)

The purpose of this individually assessed quiz is to develop your skills in identifying the flora of our rainforest by using spot characters and identification tools. As the rainforest of Atherton Tablelands is home to a diverse flora the familiarization with the most common species will help to better understand the roles these plants play in the ecosystems of this region. Plant ID skills depends on attention to detail and trains your observational powers. These skills are applicable in forest regions beyond the Australian tropics. We will conduct an intensive plant ID workshop early in the course to practice techniques of plant identification.

Final Exam (20%)

During the final exam you will be tested on material presented in lectures, field lectures and excursions. Answering questions will require critical and analytical thinking across the various teaching units.

Participation (5%)

Active participation in the entire course is crucial to a successful learning experience. A participation grade will be given assessing students' active participation in discussions, lectures, and field work.

Grading Scheme

A	95.00 - 100.00%	B+	86.00- 89.99%	C+	76.00 - 79.99%	D	60.00 - 69.99%
A-	90.00 - 94.99%	B	83.00 - 85.99%	C	73.00 - 75.99%	F	0.00 - 59.99%
		B-	80.00 - 82.99%	C-	70.00 - 72.99%		

General Reminders

Honor Code/Plagiarism – At SFS, learning is built on trust, curiosity, and respect - for ourselves, each other, and the communities we engage with. Academic integrity is part of that shared commitment. Students commit to the SFS academic honor code:

I approach coursework, fieldwork, and research with integrity and commit to full participation. I do my own work with honesty and give credit where it's due. I use tools and technology responsibly and only as permitted. I speak up when something conflicts with our shared values. I respect the communities we learn from and commit to ethical, non-extractive research that keeps knowledge connected to the places and people who share it with us.

Cheating, plagiarism, unauthorized use of technology, or any action that misrepresents your work falls outside our values. Disciplinary action will be taken as detailed in the Student Code of Conduct.

AI Usage in Assignments – SFS acknowledges the growing role of artificial intelligence (AI) tools in education and professional settings. While AI can be a valuable resource for learning and productivity, its use must align with the learning goals and integrity of each assignment. For this reason, students are encouraged to discuss the acceptable uses of AI for each assignment with the instructor. If you wish to use AI for any part of an assignment, consult with the instructor beforehand to ensure that its use adheres to the academic expectations of the course. Let's work together to navigate this evolving landscape responsibly

Deadlines – Deadlines for written and oral assignments are instated to promote equity among students and to allow faculty ample time to review and return assignments before others are due. As such, deadlines are firm; extensions will only be considered under extreme circumstances. Late assignments will incur a penalty of 10% of your grade for each day you are late. After two days past the deadline, assignments will no longer be accepted. Assignments will be handed back to students after a one-week grading period. Grade corrections for any assessment item should be requested in writing at least 24 hours after assignments are returned. No corrections will be considered afterwards.

Content Statement – Every student comes to SFS with unique life experiences, which contribute to the way various information is processed. Some of the content in this course may be intellectually or emotionally challenging but has been intentionally selected to achieve certain learning goals and/or showcase the complexity of many modern issues. If you anticipate a challenge engaging with a certain topic or find that you are struggling with certain discussions, we encourage you to talk about it with faculty, friends, family, the HWM, or access available mental health resources.

Participation – Since we offer a program that is likely more intensive than you might be used to at your home institution, missing even one lecture can have a proportionally greater effect on your final grade simply because there is little room to make up for lost time. Participation in all components of the course is mandatory, it is important that you are prompt for all activities, bring the necessary equipment for field exercises and class activities, and simply get involved.

Course Content

L: Lectures, FL: Field Lectures, GL: Guest lecture, REV: Review, FEX: Field Exercise, WS: Workshop

**Readings in bold are required.*

No	Topics Covered	Hours	Type	Required Readings
1	Course Overview This lecture gets you into the swing of discovering Australia's natural assets and exploring ecological patterns and processes	1.0	L	Attiwill and Wilson (2006).
2	Introduction to the Wet Tropics Through a video you will be introduced to the history of the Wet Tropics, the human impacts on it and how communities (including CRS) are trying to restore ecosystems and biodiversity of the Australian Wet Tropics	1.0	L	Tracey (1982).
3	Australian Aboriginal History & Culture A brief introduction to Australian Aboriginal culture and history	1.0	L	<i>Optional:</i> <i>Rumsey (1993).</i> <i>Bradshaw (2011).</i> <i>Hepburn (2015).</i> <i>Larson (2010).</i> <i>Pitts (2004).</i>
4	Aboriginal Cultural Heritage Experience We will attend a Pamagirri Rainforest Walkabout to explore this ancient culture amongst the backdrop of the tropical rainforest.	4.0	FL; GL	

No	Topics Covered	Hours	Type	Required Readings
5	Past and Current Landscapes of the Atherton Tablelands Using the township of Malanda as a case study, we will experience first-hand the effects of human land-use on the rainforests of the area, and gain an understanding of the Rainforest Aboriginal Ngadjon-Jii people	4.5	FL	Haberle (2005). <i>Optional:</i> <i>Stephensons (1989).</i>
6	Biomes 1: The Tropical Rainforest You will understand the main factors that determine the occurrence of a Rainforest in an area. You will learn how to recognize and classify this important biome and learn about its relevance	2.0	L	Bowman (2000). <i>Optional:</i> <i>Richards (1952).</i> <i>Tracey (1982).</i> <i>Adam (1992).</i>
7	Biomes 2: Wetlands and Mangroves We will explore what is considered a freshwater and a coastal wetland, and understand in which environmental conditions each type occurs. You will learn why this is such a unique habitat where the plants need to deal with a waterlogged condition. We will explore the connection between land and sea.	1.0	L	Keddy (2010). McLeod, et al. (2011).
8	Natural History of Science We talk about the role of natural history in the development of science in Australia. This lecture sets up a context for the plant ID workshop and biodiversity assignment.	1.0	GL	
9	Importance of Taxonomic Work You will hear about the history of classifying plant species and why taxonomic work is crucial for any scientific and conservation work	1.0	GL	
10	Plant Identification Workshop This workshop will introduce the fine art of rainforest plant ID using spot characters	2.5	GL	Hyland, et al. (2010). Jackes (2001).
11	Meet the Early Birds An introduction on how to best familiarize yourself with an unknown bird fauna.	1.0	FL	Various field guides to the birds of the Wet Tropics.
12	Vertebrates of Rainforests and Freshwater Ecosystems of the Wet Tropics We will talk about the lives of some faunal elements of the rainforest and water streams around you. Keep your eyes open and always explore the fauna.	1.0	L	Ramsey (2005). Wildlife of Tropical North Queensland (2000).
13	Biomes 3: Marine Biomes and Wildlife An overview of marine biomes and marine diversity. This session will be an introduction for your excursion to an offshore island in the Great Barrier Reef	1.0	GL	Castro and Huber (2016). <i>Optional:</i> <i>Hayden, et al. (1984).</i>

No	Topics Covered	Hours	Type	Required Readings
14	Biodiversity Assignment Briefing & Consultations We will talk about using iNaturalist as a way to document biodiversity observations, and you will be briefed on your assignment	2.5	L; FEX	Callaghan, et al. (2021). Mesaglio and Callaghan (2021).
15	Lightsheeting Gain an appreciation of the diversity of nocturnal invertebrates in the Wet Tropics. This field work will be part of your Field Exercise and Biodiversity Assignment.	2.0	FEX	Richardson (2016).
16	The Scientific Method & Designing Ecological Studies You will learn how to plan and design an ecological study and the main techniques that are used in this field.	1.0	L; WS	Kent (2011). <i>Optional:</i> <i>Ellenberg and Mueller-Dombois (1974).</i> <i>Elzinga, et al. (2001).</i>
17	Field Exercises These exercises are designed to give you practical experience in ecological field studies.	10.0	L; FL; FEX	Ellenberg and Mueller-Dombois (1974). Elzinga, et al. (2001). Kent (2011).
18	Make Sense of Your Data It is time to understand how to analyse your data. You will learn about some necessary steps to make sense of your data, from data exploration to more refined analysis to test your hypotheses like GLM, LM and NMDS.	4.0	L; WS	Zuur, et al. (2010). <i>Optional:</i> <i>Chatfield (1998).</i>
19	Climate Change & Anthropogenic Impacts on Natural Ecosystems Understanding climate change has become crucial for critical thinking about a more sustainable future. In this workshop you are going to get a hands-on introduction to the anthropogenic causes of climate change and its consequences	2.0	L	Rahmstorf, et al. (2007). Thuiller (2007). Swain, et al. (2020).
20	Invasive Species You will learn about the concept of invasive species and how and why species become invasive. You will learn to think critically about whether this issue is the cause or the consequence of a bigger problem, and what the international community is doing about invasive species.	1.0	L	Colautti and MacIsaac (2004). Didham, et al. (2005).
21	Habitat Loss and Fragmentation; and How to Mitigate Their Impacts on Ecosystems of the Wet Tropics In a lecture and field excursion you will be introduced to the severe impact of fragmentation and habitat loss	5.5	L; FL; FEX	

No	Topics Covered	Hours	Type	Required Readings
	on the biodiversity of the Wet Tropics. You will see how the community and CRS take actions to restore lost habitat for our wildlife. And you will contribute to some of these actions.			
22	Regenerative Agriculture and Climate Resilience In this class you are going to learn a brief history of industrial agriculture and its consequences on the environment. We will explore alternative ways of growing food that are more aligned with nature.	3.5	L; FL; GL	Götsch (1995). Andrade, et al. (2020).
23	Coastal Ecosystems and Reef Ecology and Restoration (Offshore Island Excursion) Explore the ecology of the reef and adjacent ecosystems.	7.5	FEX	Cheal, et al. (2012). Georgiou, et al. (2015). Jones, et al. (2018). <i>Optional: Wooldridge and Brodie (2017). Turton (2019).</i>
24	Exam Review Consult your faculty during exam preparation.	1.0	REV	
	Total	61		

Reading List

Readings in bold are required.

1. Adam, P. (1992). Australian rainforests. Oxford University Press.
2. **Andrade, D., et al. (2020).** Syntropy and innovation in agriculture. Current Opinion in Environmental Sustainability, 45, 20-24.
3. Attiwill & Wilson (2006). Ecology. An Australian Perspective. (2nd ed). Oxford University Press.
4. **Bowman, D.M.J.S. (2000).** Australian rainforests: islands of green in a land of fire. Cambridge University Press. (Selected chapters)
5. Bradshaw (2011)
6. Callaghan, C. T., et al. (2021). Three frontiers for the future of biodiversity research using citizen science data. BioScience, 71, 55-63.
7. **Castro & Huber (2016).** Marine Biology. (10th ed.). McGraw-Hill Education. (Selected chapters)
8. Chatfield, C. (1998). Problem Solving: A Statistician's Guide. Chapman & Hall, BocaRaton, FL.
9. **Cheal et al. (2012).**
10. **Colautti, R. I., & MacIsaac, H. J. (2004).** A neutral terminology to define 'invasive' species. Diversity and Distributions, 10, 135-141.
11. **Didham, R. K., et al. (2005).** Are invasive species the drivers of ecological change?. Trends in ecology & evolution, 20, 470-474.
12. Ellenberg, D., & Mueller-Dombois, D. (1974). Aims and methods of vegetation ecology. New York: Wiley.

13. Elzinga et al. (2001). Monitoring plant and animal populations. Blackwell Science, Inc.
- 14. Georgiou et al. (2015).**
15. **Götsch, E. (1995).** Break-through in agriculture (p. 22p). Rio de Janeiro: AS-PTA.
16. **Haberle, S. (2005).** A 23,000-yr pollen record from Lake Euramoo, wet tropics of NE Queensland, Australia. *Quaternary Research*, 64, 343-356.
17. Hayden, B. P., Ray, G. C., & Dolan, R. (1984). Classification of coastal and marine environments. *Environmental Conservation*, 11, 199-207.
18. Hepburn (2015)
19. Hyland, B.P.M., et al. (2010). Australian tropical rainforest plants. Trees, shrubs and vines. Version, 6.
20. Jackes, B.R. (2001). Plants of the tropics : rainforest to heath ; an identification guide. Townsville, Qld: James Cook University, School of Tropical Biology.
- 21. Jones et al. (2018).**
22. **Keddy, P.A. (2010).** Wetland ecology: principles and conservation (2nd ed.). New York: Cambridge University Press.
23. **Kent, M. (2011).** Vegetation description and data analysis: a practical approach. John Wiley & Sons. (Selected chapters)
24. Larson (2010)
25. **McLeod, E., et al. (2011).** A blueprint for blue carbon: toward an improved understanding of the role of vegetated coastal habitats in sequestering CO₂. *Frontiers in Ecology and the Environment*, 9, 552-560.
26. **Mesaglio, T., & Callaghan, C. T. (2021).** An overview of the history, current contributions and future outlook of iNaturalist in Australia. *Wildlife Research*.
27. Pitts (2004)
28. Rahmstorf, S., et al. (2007). Recent climate observations compared to projections. *Science*, 316(5825), 709-709.
- 29. Ramsey (2005)**
30. Richards, P. W. (1952). The tropical rain forest. The tropical rain forest: an ecological study. Cambridge University Press.
31. Richardson, B. (2016). Tropical Queensland Wildlife from Dusk to Dawn
32. Rumsey (1993)
33. Stephenson, P.J. (1989). Rocks and Landscapes of the Cairns District.- Qld Dept. of Mines – CRS Library ECO081;
34. **Swain, D. L., et al. (2020).** Attributing extreme events to climate change: A new frontier in a warming world. *One Earth*, 2(6), 522-527.
35. **Thuiller, W. (2007).** Climate change and the ecologist. *Nature* 448, 550–552
36. Tracey, J. G. (1982). Vegetation of the humid tropical region of north Queensland. CSIRO, Melbourne.
37. Turton (2019).
38. Wooldridge and Brodie (2017).
39. **Zuur, A. F., Ieno, E. N., & Elphick, C. S. (2010).** A protocol for data exploration to avoid common statistical problems. *Methods in ecology and evolution*, 1(1), 3-14.