Annexe A: New/Revised Course Content in OBTL+ Format

Course Overview

The sections shown on this interface are based on the templates UG OBTL+ or PG OBTL+
If you are revising/duplicating an existing course and do not see the pre-filled contents you expect in the subsequent sections e.g. Course Aims, Intended Learning Outcomes etc. please refer to Data Transformation Status for more information.

Expected Implementation in Academic Year	AY2024-2025
Semester/Trimester/Others (specify approx. Start/End date)	Semester 2
Course Author * Faculty proposing/revising the course	Eleanor Slade (Assoc. Prof)
Course Author Email	Eleanor.slade@ntu.edu.sg
Course Title	TROPICAL ECOLOGY
Course Code	ES3302
Academic Units	3
Contact Hours	39
Research Experience Components	Research Defined Course (at least 50% of deliverables involve practical research activities: problem identification, hypothesis forming, data collection/analysis/interpretation, result communication)

Course Requisites (if applicable)

Pre-requisites	ES1006 Introductory Field Experience, ES2003 E2S2 Biosphere
Co-requisites	Nil
Pre-requisite to	Nil
Mutually exclusive to	Nil
Replacement course to	Nil
Remarks (if any)	Nil

Course Aims

Tropical forests are the most diverse ecosystems on earth, supporting over 50% of all biodiversity. They play a major role in regulating global climates and are key to the livelihood of a substantial proportion of the world's human population. However, they are also among the most threatened of all biomes. Understanding the ecology and evolution of tropical forests, and people's dependence on these habitats is fundamental to their future management and conservation. This course will help you appreciate how conducting experiments and surveys in the field is critical to understanding and using the theory you learn in the classroom. The course presents the natural history and ecology of tropical forests through practical exercises, lectures, site visits, tutorials, small group project work and (most importantly), day to day experience in the field. You will learn survey techniques for monitoring plants, vertebrates and invertebrates and ecosystem functions, visit and discuss large-scale experiments, forest management and restoration sites, and explore the importance of evidence-based science for conservation and management of tropical ecosystems.

Course's Intended Learning Outcomes (ILOs)

Upon the successful completion of this course, you (student) would be able to:

ILO 1	Describe the natural and anthropogenic heterogeneity of tropical forest habitats and associated variations in biodiversity and ecosystem functioning.
ILO 2	Identify the ecological, evolutionary and biogeographic processes leading to high diversity in tropical forests in general, and SE Asian forests in particular.
ILO 3	Discuss the importance of natural history and taxonomy for the study of biodiversity in tropical forests.
ILO 4	Relate ecological concepts to the design of large-scale experiments in tropical forest.
ILO 5	Explain the drivers of change in tropical forests and give examples of solutions.
ILO 6	Recognise the challenges and complexities of conservation and sustainable management in tropical forests and critically assess the evidence for conservation actions.
ILO 7	Employ fieldwork skills and experience relevant to practical tropical forest ecology and biodiversity.
ILO 8	Demonstrate skills in research project design, execution, and analysis through the completion of small-group research projects.

Course Content

1. Tropical Forest Ecology

Understand the ecological, evolutionary and biogeographic processes leading to high diversity in tropical forests. Discuss importance of natural history and taxonomy in the study of biodiversity of tropical forests.

2. Biodiversity Field Surveys

Undertake biodiversity field surveys for vertebrates (herps surveys, camera trapping, mist netting, acoustic surveys), invertebrates (butterflies, dung beetles, dragonflies, stream inverts), plants (seedling and tree id).

3. Large scale experiments in tropical forests

Give examples of large-scale experiments in tropical forests in Sabah (e.g. 50 ha plots, Biodiversity Experiment, mammal exclosures, SAFE project) and what they can tell us about tropical forest ecology and conservation.

4. Tropical Forest Management and Conservation

Understand the threats and drivers of change in tropical forests (e.g. logging, agriculture) and oceans (e.g. land use change, climate change), how they can be managed (e.g. forest restoration, RIL, sustainable forest management), and pragmatic solutions (e.g. connectivity, Protected Areas, muti-use areas, carbon trading, ecotourism, community involvement). Critically assess the evidence for conservation actions.

Reading and References (if applicable)

We do not have a course text as such. At this level, we think that it is best to direct you towards the primary literature and authoritative review articles; these will be highlighted in individual lectures and tutorials. Having said that, the following books provide good background information on tropical forests and will often be referred to in the lectures. You do not need to bring copies of these books on the field course.

- Ghazoul, J. & Sheil, D. (2010). *Tropical Rain Forest Ecology, Diversity and Conservation*. Oxford University Press.
- Chazdon, R. (2014). *Second Growth: The Promise of Tropical Forest Regeneration in an Age of Deforestation*. University Chicago Press.
- Corlett, R.T. (2019). *The Ecology of Tropical East Asia*. Oxford University Press.
- Hazebroek, H.P. et al. (2012). *Danum Valley - The Rain Forest*. Natural History Publications, Borneo.
- Sodhi, N.S. & Ehrlich, P.R. (eds.) (2011) *Conservation Biology for All*. OUP.
- Kareiva, P., Marvier, M & Silliman (B. (eds.) (2018) *Effective Conservation Science: Data not Dogma*. OUP.

<u>Background Reading Specific to Borneo</u>

Some of you may want to do some background reading more specific to Borneo in preparation for your trip. As a context-setter you may want to look at the Borneo chapters (Chapters 4 & 5) of The Malay Archipelago by Wallace, which provides a historical introduction to Borneo and its biodiversity (Wallace, A.R. (reprinted 2000) *The Malay Archipelago*. Periplus Editions).

Bringing things slightly more up to date we recommend looking at a Special Edition of *Philosophical Transactions of the Royal Society* published in 2011 on "The future of Southeast Asian rainforests in a changing landscape and climate."

See http://rstb.royalsocietypublishing.org/content/366/1582.toc

The papers by Reynolds et al., Bagchi *et al*., Hill *et al*., Hector *et al*. and Foster *et al.* are particularly relevant to the field course content.

- Check out Tansley MJ, Veryard R, Simonsen DF, Morford J, Chung AYC, Parrett JM, Slade EM (2021). Rivers are not complete barriers to the movement of tropical forest dung beetles. Sepilok Bulletin 30: 1-18. This paper was published by some Oxford undergraduates based on their field course project in Danum! Using MRR to investigate if dung beetles can cross large river barriers. So it is possible to do neat studies in a short project time frame :)

<u>Field guides</u>

- Rogier De Kok and Tim Utteridge (2010) Field Guide to the Plants of East Sabah, Malaysia. Royal Botanic Gardens, Kew.

- Quentin Phillipps and Karen Phillipps (2014) Phillipps' Field Guide to the Birds of Borneo. John Beaufoy Publishing Ltd.
- Susan Myers (2016) Birds of Borneo: Brunei, Sabah, Sarawak, and Kalimantan (Princeton Field Guides) New Holland Publishers Ltd.
- Quentin Phillipps and Karen Phillipps (2018). A Field Guide to the Mammals of Borneo. John Beaufoy Publishing Ltd.
- Indraneil Das (2020) Snakes and other reptiles of Borneo. Bloomsbury Pocket Guides.
- Indraneil Das (2004) Pocket Guide to Lizards of Borneo. Natural History Publications.
- Inger et al (2016) A Field Guide to the Frogs of Borneo. Natural History Publications.
- Stuebig et al (2000) A Field Guide to the Snakes of Borneo. Natural History Publications.

Planned Schedule

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
1	Lectures start from Week 8 - 13				
2	Lectures start from Week 8 - 13				
3	Lectures start from Week 8 - 13				
4	Lectures start from Week 8 - 13				
5	Lectures start from Week 8 - 13				
6	Lectures start from Week 8 - 13				
7	Lectures start from Week 8 - 13				
8	Introduction to Tropical Rainforests and the course	1		In-person	Lecture
9	Diversity of Tropical Forests	1,2		In-person	Lecture & tutorial
10	Importance of taxonomy and natural history	3		In-person	Lecture & tutorial
11	Conservation evidence	6		In-person	Lecture & tutorial

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
12	Tropical Forest Conservation Solutions	4,5,6		In-person	Lecture & Tutorial
13	Briefings before going to the field			In-person	

Learning and Teaching Approach

Approach	How does this approach support you in achieving the learning outcomes?
Lectures	There will be lectures throughout the course to pass on the theoretical knowledge required to understand the ecology of tropical forests and their management and conservation. These will be done in an interactive way, involving your participation in the form of discussions and contributions and you are encouraged to ask questions and discuss topics, and you are expected to actively engage in this and think how the lectures can be applied to what you are learning in the field. The project and reflections assignment will allow you to apply the content covered during lectures (LO 1,2,3,4,5,6).
Tutorials	During tutorials we will discuss pre-assigned papers/readings/datasets. The tutorials will allow you a space to discuss in-depth what you have learned in the lectures and readings and think about how this knowledge relates to what you will see in the field. You will be encouraged to share your thoughts and observations with your classmates informally through discussion and presentations in pairs/groups (LO 1-6).
Project & presentation	You will work in groups to come up with a question you would like to test and design a study to test your question. You will work together to execute the project and present your project and simple analyses to your classmates and the lecturers. This will allow you to put everything you have learnt into practice, and enable both independent learning and critical thinking, as well as learning from each other. This will develop both your research, team-work and presentation skills (LO7,8).
Reflections	For this assignment you should reflect the topics, knowledge, and discussions we have had during the course, and produce your own independent piece of work on a question/topic/opinion that interests you. You can express yourself however you would like, using any media – animations, videos, art, policy brief, opinion piece. You should use this assignment to explore what you have learnt during the course in any way you choose. This will develop your critical thinking (LO 1-6).
Field based learning	The main LO (LO 7) of this course is learning through immersion and participation. You will be taught fieldwork skills, survey skills for different taxa, taxonomic and natural history skills through hands-on learning in the field guided by the lecturers, TAs and field assistants. You are expected to actively participate in the field activities and are encouraged to ask questions and discuss topics while in the field. This will develop your field-based research skills, and team-work, and allow you to apply the content you learnt in lectures to (LO 1-8).

Assessment Structure

Assessment Components (includes both continuous and summative assessment)

No.	Component	ILO	Related PLO or Accreditation	Weightage	Team/Individual	Rubrics	Level of Understanding
1	Continuous Assessment (CA): Others(Field participation)	1,2,3,4,5,6, 7	1,3,4,5,6	40	Individual	Holistic	Extended Abstract
2	Continuous Assessment (CA): Class Participation(Tutorial participation)	1,2,3,4,5, 6	1,2,3,4	20	Individual	Holistic	Multistructural
3	Continuous Assessment (CA): Presentation(Project work and presentation)	7,8	1,2,3,4,5,6	20	Team	Holistic	Relational
4	Continuous Assessment (CA): Others(Reflections)	1,2,3,4,5,6	1,2,3,4,5	20	Individual	Holistic	Extended Abstract

Description of Assessment Components (if applicable)

NA

Formative Feedback

Feedback is central to this course. You will receive formative feedback verbal feedback through discussions in the field and during your field rotations and during tutorials. You are encouraged the think widely and critically about the topics discussed and make notes in your field logbook and raise questions on subjects which you do not understand.

You will get written feedback on your reflections assignment.

NTU Graduate Attributes/Competency Mapping

This course intends to develop the following graduate attributes and competencies (maximum 5 most relevant)

Attributes/Competency	Level
Adaptability	Basic
Care for Environment	Advanced
Curiosity	Advanced
Global Perspective	Intermediate
Critical Thinking	Intermediate

Course Policy

Policy (Academic Integrity)

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values. As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the academic integrity website for more information. On the use of technological tools (such as Generative AI tools), different courses / assignments have different intended learning outcomes. Students should refer to the specific assignment instructions on their use and requirements and/or consult your instructors on how you can use these tools to help your learning. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

Policy (General)

You are expected to complete all assigned readings, activities, assignments, attend all classes punctually and complete all scheduled assignments by due dates. You are expected to take responsibility to follow up with assignments and course related announcements. You are expected to participate in all project critiques, class discussions and activities.

Compulsory Assignments
You are required to submit compulsory assignments on due dates, unless a valid reason is provided. Valid reasons include falling sick supported by a medical certificate. If you will miss a deadline for a valid reason you must inform me via email (eleanor.slade@ntu.edu.sg) prior to the deadline, and as soon as is possible.

Special Accommodations
All courses will have some form of assessment and if you envision that you will have difficulty satisfying an assessment component due to your disability then you are advised to contact the Course Coordinator. Students requiring assistance in the learning environment should contact and notify the Associate Chair (Academic) in their School within the first 2 weeks of their first semester so that you and School can work together to optimise your learning experience. Examples of services that may be provided or supported in individual courses include an editor service to help those with reading and writing difficulties, and access to a personal mentor within the School. Please access the NTU Office of Academic Services' website
http://www.ntu.edu.sg/sasd/oas/Pages/

Policy (Absenteeism)

In-class activities make up a significant portion of your course grade. Absence from class without a valid reason will affect your participation grade. Valid reasons include falling sick supported by a medical certificate and participation in NTU's approved activities supported by an excuse letter from the relevant bodies. There will be no make-up opportunities for in-class activities.

Policy (Others, if applicable)

Diversity and Inclusivity Statement
The classroom is a place where you will be treated with respect, and I welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability - and other visible and non-visible differences. All members of this class are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the class.

In line with thinking about JEDI issues in teaching and conducting field-based ecology I would ask you all to read this article, and consider the principles outlined both when thinking about how we conduct ourselves and approach our learning on this field course, but also going forward as research scientists conducting our own research both at home and overseas.
A set of principles and practical suggestions for equitable fieldwork in biology
https://ecoevorxiv.org/uszd7
1) Please pay particular attention to Box 1. A set of principles to promote fieldwork: Be Collaborative, Be Legal, Be Safe, and Be Respectful.

These are the ASE Learning Outcomes:
At the completion of your course of study in ASE, you will be able to:
1) Demonstrate intellectual flexibility and critical thinking in order to apply environmental knowledge in the real world

2) Communicate environmental concepts with enthusiasm to varied audiences both orally and in writing

3) Formulate scientific questions, and be able to access and analyse quantitative and qualitative information to address them

4) Exhibit the motivation, curiosity and skills for lifelong learning

5) Demonstrate ethical values and responsibility

Collaborate and lead by influence

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Last Updated By: Natasha Bhatia (Dr)