Academic Year	2018/2019	**Semester**	1
Course Coordinator	Dr. Shawn Lum and Professor David Wardle		
Course Code	ES3304		
Course Title	Advanced Field Placement in Ecology and Society		
Pre-requisites	ES2003 Biosphere ES2303 Introduction to Ecology		
No of AUs	2		
Contact Hours	6 hours lecture (during Semester time) 59 hours lab/field work (during Special Semester)		
Proposal Date	26 March 2019		

Course Aims

This course aims to support you in developing the requisite skills to interpret patterns and processes in the field, and perform successful field work. During a field trip in Taiwan, combined with follow-up activities, you will learn to assess the factors that drive the structure and functioning of ecosystems, help frame research questions, conduct field work, process the data and interpret the results, as you would do working in an Environmental Sciences field. As such it will help put principles learned in the classroom into practice. Through this project you will essentially learn the importance of project management including prioritisation, time and resources management and liaising between different people.

Intended Learning Outcomes (ILO)

By the end of this course, you (as a student) would be able to:

1. Formulate appropriate research questions and develop and adapt methodology for testing them.
2. Apply your methodology in the field and collect sufficient data for analysis.
3. Keep written documentation of field work activity throughout the process.
4. Interpret data obtained from testing your research questions and identify potential influencing factors on the results and discuss the wider reasons behind their influences.
5. Communicate these findings both in a written report, and as an oral presentation.
6. Manage your research judiciously and collaborate in an effective manner with your classmates.

Course Content

The course will involve studying six forest plots with contrasting macroclimate in Taiwan, both along the length of Taiwan (latitudinal gradient) and across a 3000 m change in elevation in the Taroko mountains (elevational gradient). These gradients serve as 'natural experiments' for understanding how macroclimate, and potentially climate change, drive structure and functioning of forest ecosystems. You will design and implement a series of measurements across these plots, and especially along the elevational gradient, to better understand the climatic controls of terrestrial ecosystems. As such, you will conduct field research, collect data, process data and interpret the results, provide a written report and present your findings to the rest of the class.

Assessment (includes both continuous and summative assessment)

Component	Course LO Tested	Related Programme LO or Graduate Attributes (appendix 4)	Weighting	Team/ Individual	Assessment Rubrics
1. Research Log notebook	2, 3	4; 5; 6; 7; 8	10%	Individual	Appendix 1
2. Final Written Report	1,4,5,6	1; 2; 3; 4; 5; 6; 7; 9; 10	65%	Individual	Appendix 2
3. Final oral presentation	1,4,5,6	1; 2; 3	25%	Team	Appendix 3
Total			100%		

Formative feedback

You will receive informal feedback throughout the process, and the course coordinators will be with you throughout the entire field course to provide this feedback.

Learning and Teaching approach

Approach	How does this approach support students in achieving the learning outcomes?
Independent learning	This is an upper level class and therefore you are required to show initiative in your learning process. This supports aspects of all six of the learning outcomes.
Active learning	You will be in the field where you will be exposed to learning in a range of contrasting forest habitats and ecological settings, from lowland tropical forest to forests at the subalpine tree-line. This supports aspects of all six of the learning outcomes.

Reading and References

You will be expected to search for and refer to relevant literature, but as a starting point you will be directed to the following four references:

- Mayor, J. R., Sanders, N. J., Classen, A. T., Bardgett, R. D., Clément, J. J., Fajardo, A., Lavorel, S., Sundqvist, M. K., Bahn, M., Chisholm, C., Cieraad, E., Gedalof, Z., Grigulis, K., Kudo, G., Oberski, D. and Wardle, D. A. (2017) Elevation alters ecosystem properties across temperate treelines globally. Nature 542: 91-97.

- Sundqvist, M. K., Sanders, N. J. and Wardle, D. A. (2013) Community and ecosystem responses to elevational gradients: processes, mechanisms and insights for global change. Annual Reviews of Ecology, Evolution and Systematics 44: 261-280.

- Bond, W.J. (1989) The tortoise and the hare: ecology of angiosperm dominance and gymnosperm persistence. Biological Journal of the Linnean Society 36: 227–249.

- Read, Q.D., Moorhead, L. C, Swenson, N.J., Bailey, J. K. and Sanders, N. J. (2014) Convergent effects of elevation on functional leaf traits within and among species. Functional Ecology 28: 37-45

Course Policies and Student Responsibilities

You are expected to complete all assigned readings and activities, and take all scheduled assignments by due dates. You are expected to take responsibility to follow up with course notes, assignments and course related announcements you have missed.

You are expected be aware that you are representing ASE and NTU while on field courses, and behave in a way which represents the school and department favourably.

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. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

Course Instructors

Instructor	Office Location	Phone	Email
David Wardle	N2-01c-49	65923605	david.wardle@ntu.edu.sg
Shawn Lum	N2-01c-55	65927954	shawn.lum@ntu.edu.sg

Planned Weekly Schedule

The field course will take place over 9 days from the end of May and through the first week in June. In addition you will be expected to read the assigned literature prior to the field trip, and complete and submit the written assignment within one week following the field trip.

Appendix 1. Assessment criteria for Research Log notebook

Grade / Numerical Score	Criteria
A+ (Exceptional) A (Excellent)	- Log book shows clear and original insight into the research process - All entries are similarly formatted and provide all pertinent information. - Student shows diligence in competing entries consistently throughout the research process. - Any problems during the research are clearly outlined, with potential resolutions stated, and reasoning behind the chosen resolution.
A- (Very good) B+ (Good)	- Log book shows clear outline of the research process - Most entries are similarly formatted and provide most of the pertinent information. - Student shows diligence in competing entries consistently throughout the research process. - Any problems during the research are clearly outlined.
B (Average) B- (Satisfactory) C+ (Marginally satisfactory)	- Log book shows some outline of the research process - Some disparity in how entries are formatted. Some pertinent information missing. - Entries appear to be sporadic throughout the research process. - Any problems during the research are referenced but not clearly outlined.
C (Bordering unsatisfactory) C- (Unsatisfactory)	- Log book shows limited outline of the research process - No continuity in how entries are formatted. Some pertinent information missing. - Entries appear to be sporadic throughout the research process. - Any problems during the research are not clearly outlined.
D (Deeply unsatisfactory) F (Fail) (0-44)	- Log book shows no outline of the research process - No continuity in how entries are formatted. Pertinent information clearly missing. - Entries are sporadic or missing. - No further assessment or thoughts. Or - Failure to submit Research Log

Appendix 2. Assessment criteria for Final Written Report

Grade / Numerical Score	Criteria
A+ (Exceptional) A (Excellent)	- Clear description, interpretation and explanation of research process and findings - Clarity and distinct originality of thought, with clear link to major topics from research materials, as well as important linked topics. - Correct use of referencing throughout. - Use of stylish scientific language, with no grammatical or spelling errors. - Ability to introduce, review and engage critically with secondary readings (where relevant) - Shows clear understanding of key concepts and theories, and interpretation of wider context issues. - Formatted in the correct scientific specification.
A- (Very good) B+ (Good)	- Clear description and explanation of research process and findings - Clarity of thought, with clear link to major topics from research materials - Correct use of referencing throughout. - Use of scientific language, with few grammatical and no spelling errors. - Shows an understanding of secondary readings/research - Shows an understanding of the key concepts and theories. - Formatted to the correct scientific specification.
B (Average) B- (Satisfactory) C+ (Marginally satisfactory)	- Some description and explanation of research process and findings - Some discernable links to the major topics from research materials - Correct use of referencing throughout most of the paper. - Fair use of scientific language, with some grammatical and spelling errors. - Shows a fair understanding of secondary readings/research - Shows some understanding of the key concepts and theories. - Formatted to the correct scientific specification.
C (Bordering unsatisfactory) C- (Unsatisfactory)	- Some description of research process and findings - Limited link to major topics from research materials - Correct use of referencing throughout some of the paper. - Some use of scientific language, with grammatical and spelling errors. - Identifies secondary readings/research - Identities key concepts and theories. - Some attempt to format to the correct scientific specification.
D (Deeply unsatisfactory) F (Fail) (0-44)	- Unclear or no description of research process and findings - Failure to link to major topics from research materials - Incorrect use of referencing throughout most of the paper. - No scientific language, with grammatical and spelling errors. - No secondary readings/research referenced. - No identification or misinterpretation of key concepts and theories. - Incorrect formatting. Or - Failure to submit final report

Appendix 3. Assessment criteria for Final Oral Presentation

Grade / Numerical Score	Criteria
A+ (Exceptional) A (Excellent)	- Exceptionally prepared for the presentation, thorough rehearsal and time checks. - Content covers all the required elements extensively, excellent structure, and introduces additional knowledge through secondary readings at appropriate times. - Delivery is clear, articulate and concise. - Any questions are answered knowledgably. - Presentation is precisely timed to allow introduction and conclusions, as well as adequate time for questions/discussion. - Students asks questions to the other presenters, showing understanding and engagement with the rest of the class.
A- (Very good) B+ (Good)	- Well prepared for the presentation, adequate rehearsal and time checks. - Content covers all the required elements, is well structured, and introduces some additional knowledge through secondary readings at appropriate times. - Delivery is clear, articulate and concise. - Any questions are answered correctly. - Presentation is well timed to allow introduction and conclusions, with some time for questions/discussion. - Students asks questions to the other presenters, showing understanding and engagement with the rest of the class.
B (Average) B- (Satisfactory) C+ (Marginally satisfactory)	- Shows some preparation for the presentation, some rehearsal and time checks. - Content covers most of the required elements, and shows adequate structure. - Delivery is adequately clear, articulate and concise. - Any questions are answered correctly. - Presentation is adequately timed but may not allow full questions/discussion time. - Students show some engagement with some of the class.
C (Bordering unsatisfactory) C- (Unsatisfactory)	- Shows marginal preparation for the presentation, marginal rehearsal and time checks. - Content covers some of the required elements, and shows little structure. - Delivery is marginally clear, articulate and concise. - Any questions are answered mostly correctly. - Presentation is inadequately timed. - Students show limited engagement with some of the class.
D (Deeply unsatisfactory) F (Fail) (0-44)	- Shows no preparation for the presentation, no rehearsal and time checks. - Content covers none of the required elements, and no obvious structure. - Delivery is not clear, articulate and concise. - Any questions are answered incorrectly. - Presentation is poorly timed. - Students show obvious lack of engagement with the rest of the class. Or - Failure to give presentation

Appendix 4. ASE learning Outcomes

1) Apply environmental knowledge and concepts to make sound decisions

- Interpret evidence to give sound environmental advice to stakeholders
- Give advice to industry regarding existing environmental legislation
- Synthesise the views of key stakeholders to make decisions involving environmental issues

2) Demonstrate intellectual flexibility and critical thinking

- Demonstrate intellectual flexibility to view environmental issues from multiple perspectives
- Question assumptions behind current ways of solving environmental problems
- Show willingness to adopt new ways of approaching environmental problems.

3) Demonstrate passion and use advanced communication skills to share that passion

- Learn independently and then share that knowledge with others
- Effectively communicate environmental concepts in writing
- Effectively communicate environmental concepts in speech
- Effectively communicate environmental concepts in various forms of media such as data visualisation, diagrams, animation, video, or podcasts

4) Formulate key scientific questions and develop hypotheses

- Research and formulate questions involving environmental issues
- Express and explain why these questions are important
- Create and evaluate hypotheses to research such questions

5) Conduct research

- Search for relevant scientific literature
- Interpret scientific literature
- Synthesize findings from scientific literature into current laboratory or field work
- Make first-hand observations in order to draw conclusions

6) Solve environmental problems

- Solve environmental problems systematically
- Solve environmental problems creatively
- Solve environmental problems reflexively
- Express and explain why the problems are important

7) Synthesize interdisciplinary approaches to solving problems

- Apply techniques from disciplines beyond your own field to solve environmental problems

- Express and explain how a problem solving approach may impact the environment
- Express and explain how an approach to solving an environmental problem may impact human society

8) Demonstrate the willingness and skills for lifelong learning

- Demonstrate good observation skills and a curiosity about the world
- Demonstrate critical thinking skills such as analysis, discrimination, logical reasoning, prediction and transforming knowledge

9) Demonstrate ethical values

- Use knowledge and skills to contribute to the world
- Debate the ethical implications of scientific processes and results
- Respect regulations involving plagiarism and copyright
- Respect requirements regarding confidentiality, data protection, conflict of interest, and falsification of data

10) Demonstrate collaboration and leadership skills

- Learn collaboratively and be willing to share expertise with peers
- Demonstrate leadership of small teams