MRes Tropical Forest Ecology
COURSE GUIDE 2020-21
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1 COURSE OVERVIEW

Welcome to Imperial College London and the MRes in Tropical Forest Ecology.

This course reflects the research interests and activities of a growing number of Imperial staff who work in the tropics, both at Silwood Park and from other departments at the South Kensington campus.

The aim of the course is to teach you how to do excellent science in tropical forest environments, and the emphasis is on learning the skills to become an independent researcher and scientist. We will provide you with high-level research training in the latest developments in tropical forest ecology, covering the physical and biological aspects of the forest ecosystem, and give you the opportunity to explore those developments and apply your skills in your own research project.

The taught component of the course provides an introduction to a range of disciplines that are relevant to tropical forest ecology through lectures, practicals and field courses. The research project provides you with the opportunity to develop a long piece of independent research either in collaboration with staff within the college or with other institutions in the UK or internationally.

1.1 COURSE ADMINISTRATION

1.1.1 KEY PEOPLE AND CONTACTS

<table>
<thead>
<tr>
<th>Role</th>
<th>Name</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Director</td>
<td>Prof. Rob Ewers</td>
<td>ext. 42223, <a href="mailto:r.ewers@imperial.ac.uk">r.ewers@imperial.ac.uk</a></td>
</tr>
<tr>
<td>Course co-Director</td>
<td>Prof. Vincent Savolainen</td>
<td>ext. 42374, <a href="mailto:v.savolainen@imperial.ac.uk">v.savolainen@imperial.ac.uk</a></td>
</tr>
<tr>
<td>Postgraduate Administrator</td>
<td>Mrs. Amanda Ellis</td>
<td>ext. 42251, <a href="mailto:amanda.ellis@imperial.ac.uk">amanda.ellis@imperial.ac.uk</a></td>
</tr>
<tr>
<td>Postgraduate Tutor</td>
<td>Dr. Will Pearse</td>
<td><a href="mailto:will.pearse@imperial.ac.uk">will.pearse@imperial.ac.uk</a></td>
</tr>
<tr>
<td>Course Representative</td>
<td>Up to you (see note below)</td>
<td></td>
</tr>
</tbody>
</table>

Each Masters course has one or more Course Representatives to represent the student body at Student-Staff meetings and act as a first point of contact if and when issues arise that need to be discussed with the Course Directors. You will be asked in the first week of term to decide among yourselves who will represent you.

1.1.2 COURSE DATES AND TIMETABLES
The course runs for one year, beginning in the first Monday of October and ending in the last week of September the following year. The taught components of the courses (lectures, practicals and workshops) typically start at 10.00 and finish by 17.00 but this will vary from week to week – details for each week are provided on an electronic timetable. Wednesday afternoon is normally, but not always, reserved for sports, leisure activities or private study.

In addition to the formal taught and research components of the programme, there is a research seminar series that runs at Silwood Park. It runs on Thursdays 13.00 and seminars are typically presented by visiting academics. You are expected to attend these seminar series – they will expose you to a much greater breadth of relevant topics and potential project ideas than we can do within the course itself.

1.1.3 COURSE MATERIALS

Teaching and other course materials are provided using the online Blackboard virtual learning environment: http://bb.imperial.ac.uk and/or sent to you via email. Paper copies of lecture notes and hand-outs are not normally provided but you will receive printing credit for use during the course on your security card.

It is expected that reading and coursework will require additional study in your own time. During research projects, you are expected to work full time on the project, including Wednesday afternoons. Some projects may require out-of-hours work.

The full programme specification is available on Blackboard and from the course website below, but the following sections provide a summary of the programme and assessment structure.


1.2 COURSE AIMS

The aim of this course is to provide you:

- A thorough understanding of a range of theoretical and practical aspects of interdisciplinary research in tropical forest ecology
- A thorough understanding of a range of modern field techniques used in tropical forest ecology
- An ability to design an appropriate research plan to answer a particular science question
- An ability to generate and interpret ecological data of various kinds
- A sophisticated approach to designing scientific data collection to test ecological theory
A broad range of transferable skills giving you the ability to manage ecological research

The course aims will be achieved by providing:

- A course of lectures, seminars and practicals within distinct elements linked to cutting edge academic research and research groups in Silwood Park and collaborator institutions elsewhere.

- A three week field course providing practical experience in the taxonomic identification of plants, vertebrates and invertebrates, and hands-on experience in designing, collecting and managing meteorological, hydrological, biogeochemical and biodiversity field data.

- A 30 week research project on an advanced and original topic in tropical forest ecology, supervised by academics in Silwood Park or in collaboration with researchers at external institutions.

1.3 LEARNING OUTCOMES

You will emerge from this course with knowledge and understanding of:

- The ecosystem processes operating in tropical forests.

- Key taxa involved in tropical forest ecosystem processes.

- Techniques in tropical forest ecology; the main tools for addressing ecological questions in tropical forest ecology, from data collection to statistical analysis and mathematical modelling.

- Key issues in tropical forest ecology, covering the fundamental underlying science and key knowledge gaps about ecological processes.

- Research techniques, including information retrieval, experimental design and statistics, modelling, field sampling, field safety, analysis and presentation of results.

- Transferable skills including problem definition, project design, project management, teamwork, written, poster and oral reports, scientific publications.

1.4 TRANSFERABLE SKILLS

A central objective of the MRes Tropical Forest Ecology is to prepare you for PhD studies and/or a career in tropical forest ecology by teaching a suite of transferable skills. You will learn a unique set of transferable skills that are relevant to conducting research across the broad discipline of ecology, be that in a tropical forest or another biome.

Your skill set will include practical skills such as how to:

- Identify key taxa of plants, vertebrates and invertebrates
• Plan and safely execute field-based data collection
• Field first aid
• Use computational tools and packages
• Apply statistical and modelling skills to understand and interpret quantitative analyses
• Analyse scientific results and determine their strength and validity
• Write concisely and effectively for a scientific and a lay audience
• Use the scientific literature effectively

You will also emerge from the course with a suite of professional skills including how to:

• Manage research: decision making, problem definition, project design and evaluation, risk management, teamwork and coordination
• Integrate and evaluate information from a variety of sources
• Transfer techniques and solutions from one discipline to another
• Use Information and Communications Technology
• Manage resources and time

1.5 COURSE ACTIVITIES AND ASSESSMENT

1.5.1 COURSE STRUCTURE

You must attend the first 11 weeks of taught elements in the Autumn Term, and the first four weeks of taught elements and field course at the start of the Spring Term. Attendance at department seminars is compulsory when based at Silwood. You may be able to attend additional taught elements that have relevance to your project and that are taught in other courses, but your ability to attend these, and research seminars, will depend on the location of your research project – many students will be working off-site and that will prevent them from attending.

You will complete a single research project running between February and September. This represents the majority of the course and the majority of your assessment.

1.5.2 TEACHING MODE

All students will have the opportunity for an on-campus experience with some teaching activities being delivered remotely and some on campus. All activities that are delivered on-
The campus will have a remote option or provision for any students who cannot attend in person.

The College will deliver the programme to ensure the approved learning outcomes are met and will take steps to make alternative arrangements in any extreme circumstances where this is not possible.

Lecture recordings will be provided online. Practicals, where students get hands-on support, will take place in-person in Silwood Park, subject to the requirements (at the scheduled time of the sessions) of public health guidance and College guidelines on social distancing and any health and safety measures.

Student groups may be formed and rotated to ensure compliance with social distancing. All practicals will also have a remote option for students who cannot take part in person, or as back-up in case we are not safely able to teach in-person. Q&A sessions will take place to allow ample opportunity for any further student questions.

Some field trips and placements may be cancelled, postponed, rescheduled or amended, or delivered remotely. Thus, in exceptional circumstances, projects may have to be undertaken remotely rather than within a lab or field setting.


[https://www.imperial.ac.uk/about/covid-19/students/learning-experience/postgraduate-research/programme-details-for-academic-year-2020-21/mres-tropical-forest-ecology-offer-holders/](https://www.imperial.ac.uk/about/covid-19/students/learning-experience/postgraduate-research/programme-details-for-academic-year-2020-21/mres-tropical-forest-ecology-offer-holders/)

### 1.5.3 COVID-19 CONTINGENCY PLANS

**We do not expect to be able to run the field course in Malaysia, nor do we expect to run tropical field projects. All provision will depend on U.K. government, as well as international governments, guidelines.**

This year presents the course with the unprecedented challenge of teaching tropical ecology during a pandemic. International travel is heavily restricted and there is no certainty about when, or to what extent, travel restrictions will be lifted in the future. This uncertainty has immediate implications for a course that is predicated on conducting research in tropical nations.

We have developed a set of contingency plans that will be implemented as backups. We have checked and refined these plans in consultation with students enrolled on the course in 2019-2020 to ensure we meet your expectations to the fullest extent possible.
1.5.3.1 LECTURES AND PRACTICALS

We will use multi-mode delivery of teaching for the taught components of the course. In practice, this means that some activities will be online and others in person. The content and activities associated with any in person activities will either be duplicated, or replaced with substitute activities, online to ensure remotely participating students are still able to meet the learning objectives of the course. If you are unable to physically attend the teaching sessions, you will still be able to engage in live lectures, discussions and practicals remotely.

1.5.3.2 FIELD COURSE

We do not expect to be able to run a tropical field course this year. Instead, we will be offering replacement activities based in UK environments.

We will replicate the skillsets and ecological understanding you would develop in the tropical field course through replacement activities based in UK environments.

The MRes Tropical Forest Ecology field course is unique in valuing the development of project planning and management skills equally with the development of research skills. We typically conduct three field data collection exercises to test ecological hypotheses: these are led by student interests and in the past have been on anything from night-time carbon fluxes to small mammal occupancy patterns to fish community structures. The process of testing these hypotheses is entirely student-led. You will: (1) develop the hypotheses; (2) design a sampling strategy to test the hypotheses; (3) prepare a detailed, day-by-day work plan to ensure all the required data is collected; (4) design and prepare digital data collection forms; and (5) project-manage class teams in the field to ensure plans are implemented and/or adapted as needed. Steps 1-4 take place in the classroom before heading to the field where step 5 takes place, and replicates good field work practice where preparation before-hand determines the success or failure of the data collection.

We will replicate your development of the relevant skills and understanding – that would normally take place in Borneo – in other settings. This will predominantly be based around the use of Silwood Park and the surrounding region. In more detail:

- We will talk to you all in October to find out where your interests lie and examine the resources we will have to hand. We will determine the types of environments available to us (for example, are we near a zoo that is open, or near small streams, woodlands or other natural environments?).

- We will identify a set of relevant field course exercises that can be conducted locally to Silwood. This will likely involve approaching local organisations working with tropical organisms, such as the Eden Project, Whipsnade Zoo, and The Living Rainforest, as well as natural environments such as streams and woodlands in Berkshire.
• As always, you will take responsibility for designing projects, designing the day-to-day work plan and project-managing class teams to collect the required data.

• Where feasible, we will align the student-led field course exercises with comparable projects and data collected at the SAFE Project in Malaysia. We will arrange conference calls with SAFE Project field staff and past and present Masters and PhD students, with a view to highlighting the practical and logistical differences between working locally versus working in tropical environments.

Throughout, our emphasis on the development of transferrable and research skills remains. While we will obviously be limited to use the ecosystems and opportunities we will have available, we will be able to duplicate the student roles, responsibilities and skills development opportunities afforded to previous cohorts enrolled on this course.

1.5.3.3 THESIS PROJECTS

We do not expect to be able to offer tropical field projects this year. Instead, we will be offering field projects in UK environments or projects analysing pre-existing data collected from tropical environments.

We will be offering a range of alternative project options that fall into three categories:

• Data projects: Imperial College London researchers hold a wide array of tropical ecological data, including much that has not previously been analysed, and online data repositories give access to much more. We will work with you to develop projects that address tropical ecological questions and use pre-existing data to address them.

• Tropical field projects by proxy: It may be possible to employ local researchers employed at research sites such as the SAFE Project to generate small amounts of new data on your behalf, in which case field-based projects in the tropics can be made to work, albeit without you physically visiting the site and collecting the data yourself. You would be expected to lean heavily on the project management skills developed in the first part of the course to ensure your project design is implemented, and data collected, appropriately.

• Field projects outside the tropics: Projects will be able to exploit a wider set of non-tropical environments, as for the field course, providing opportunities to conduct field research in the UK and/or in the immediate locality of students participating in the course remotely. This option could also include projects based at local organisations working with tropical organisms, such as the Eden Project, Whipsnade Zoo, and The Living Rainforest where they are open and willing to support student projects.

These options can be mixed and matched as necessary. For example, some of you may want to use archived data but go through the process of collecting that type of data in the UK to gain the practical skills associated with it and to learn how better to analyse and interpret.
the data. Others may want to supplement the available data with new data collected by proxy. We will work with you and your project supervisor to identify the optimal mix of options for your project.

1.5.4 COURSE ASSESSMENT

- **Coursework Component**: 40% of the final mark, including practical assignment (5%), grant proposal (10%), risk assessment (5%), and three practical write ups during the field course (each worth 6.67%).

- **Research Component**: 60% of the final mark, including thesis (36%), supervisor’s report (6%), lay summary (3%), presentation (3%) and final viva (12%).

There are no written examinations.

1.5.5 ASSESSMENT TIMETABLE:

<table>
<thead>
<tr>
<th>Time</th>
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<th>Assessment</th>
</tr>
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<tbody>
<tr>
<td>17:00</td>
<td>25 Oct 2020</td>
<td>Practical assignment</td>
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<tr>
<td>17:00</td>
<td>23 Nov 2020</td>
<td>Risk Assessment</td>
</tr>
<tr>
<td>17:00</td>
<td>30 Nov 2020</td>
<td>Grant proposal</td>
</tr>
<tr>
<td>20:00</td>
<td>11 Feb 2021</td>
<td>Field course write-up 1</td>
</tr>
<tr>
<td>20:00</td>
<td>18 Feb 2021</td>
<td>Field course write-up 2</td>
</tr>
<tr>
<td>20:00</td>
<td>25 Feb 2021</td>
<td>Field course write-up 3</td>
</tr>
<tr>
<td>17:00</td>
<td>5 Aug 2021</td>
<td>Science communication</td>
</tr>
<tr>
<td>13:00</td>
<td>28 Aug 2021</td>
<td>Research project deadline</td>
</tr>
<tr>
<td>09:00 – 17:00</td>
<td>08-10 Sep 2021</td>
<td>Research project presentations</td>
</tr>
<tr>
<td>09:00 – 17:00</td>
<td>13-15 Sep 2021</td>
<td>Research project vivas</td>
</tr>
</tbody>
</table>

1.5.6 COURSE PRIZE

This course awards the **Biruté Mary Galdikas Prize in Tropical Ecology** to the top student on the course. It is decided on strictly numeric criteria: it is awarded to the student with the top mark across the whole course (coursework and project combined).

The prize is named after Prof. Biruté Galdikas, a pioneering primatology researcher who emerged from the same research group as Dian Fossey and Jane Goodall. Prof. Galdikas has a long history of working in SE Asia on forest ecology and orang-utans as a scientist, has engaged in direct, hands-on conservation actions, and her pioneering work is held in high esteem in academic circles.

1.6 EXTERNAL VIVAS AND EXAMINERS
All students will undertake an additional 30 minute viva with one of the External Examiners, to be held between the research project viva and the final meeting of the Board of Examiners. Although this is mandatory for all students, it does not form part of your assessment. These vivas form a part of both the exam moderation process and oversight of the course by the External Examiners. Dates given are provisional.

<table>
<thead>
<tr>
<th>Time</th>
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<th>Activity</th>
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</thead>
<tbody>
<tr>
<td>09:00 – 17:00</td>
<td>16-17 Sep 2021</td>
<td>External vivas</td>
</tr>
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</table>

We have either one or two external examiners depending on the number of students. For this year, the external examiner(s) will be:

Dr. Matthew Streubig
University of Kent

TBC

1.7 RECOMMENDED READING

These three books give an excellent overview of the origins of, patterns among, and ecological processes happening inside, tropical forest. Ghazoul and Sheil is broader in geographic scope, tackling tropical biomes around the world, whereas Ashton’s monograph reflects his 50 years of experience working specifically in the tropics of South East Asia. Peh et al. are not focussed on tropical forests, but have excellent breadth in their coverage of ecosystem processes relevant to forests and that aren’t covered in the other two books.


The individual taught elements that you will attend may also have required or recommended reading lists that are in addition to the texts listed above. You will find any reading lists described in the Taught Element Descriptions in this Course Handbook.
## 2 TAUGHT COURSE DETAILS, TIMETABLES AND ELEMENT DESCRIPTIONS

### 2.1 WEEKLY MODULE SUMMARY

<table>
<thead>
<tr>
<th>Week</th>
<th>Starting</th>
<th>Module</th>
<th>Convenors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5 Oct 2020</td>
<td>Silwood Campus Introduction</td>
<td>Amanda Ellis</td>
</tr>
<tr>
<td>1</td>
<td>5 Oct 2020</td>
<td>Introduction to the MRes Tropical Forest Ecology</td>
<td>Rob Ewers</td>
</tr>
<tr>
<td>2</td>
<td>12 Oct 2020</td>
<td>Field Ecology Skills</td>
<td>Catalina Estrada</td>
</tr>
<tr>
<td>3</td>
<td>19 Oct 2020</td>
<td>Biological Computing in R</td>
<td>Josh Hodge</td>
</tr>
<tr>
<td>4</td>
<td>26 Oct 2020</td>
<td>Statistics in R</td>
<td>Julia Schroeder</td>
</tr>
<tr>
<td>5</td>
<td>4 Nov 2020</td>
<td>Spatial Analyses and Geographic Information Systems (GIS)</td>
<td>David Orme</td>
</tr>
<tr>
<td>6</td>
<td>9 Nov 2020</td>
<td>Genomics and Bioinformatics</td>
<td>Matteo Fumagalli</td>
</tr>
<tr>
<td>7</td>
<td>17 Nov 2020</td>
<td>Planning research projects</td>
<td>Rob Ewers</td>
</tr>
<tr>
<td>8</td>
<td>23 Nov 2020</td>
<td>Energy, water and plants</td>
<td>Colin Prentice, Wouter Buytaert</td>
</tr>
<tr>
<td>9</td>
<td>30 Nov 2020</td>
<td>Biogeochemistry</td>
<td>TBC</td>
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<tr>
<td>10</td>
<td>7 Dec 2020</td>
<td>Biodiversity</td>
<td>Rob Ewers</td>
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<td>14 Dec 2020</td>
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<tr>
<td>12</td>
<td>21 Dec 2020</td>
<td>Winter Break</td>
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<tr>
<td>15</td>
<td>11 Jan 2021</td>
<td>Field Course Planning</td>
<td>Rob Ewers</td>
</tr>
<tr>
<td>16</td>
<td>18 Jan 2021</td>
<td>Generalised Linear Models</td>
<td>Julia Schroeder, Josh Hodge</td>
</tr>
</tbody>
</table>
17 25 Jan 2021  Advanced Statistics  Josh Hodge
18 1 Feb 2021  Project Preparation  Rob Ewers
19 8 Feb 2021  Tropical field course  Rob Ewers
22 1 Mar 2021  TFE MRes Project  None
49 7 Sep 2021  FrEEC Symposium  None
50 13 Sep 2021  Project Vivas  None

2.2 SERIES MODULE SUMMARY

<table>
<thead>
<tr>
<th>Start</th>
<th>End</th>
<th>Module</th>
<th>Convenors</th>
</tr>
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<tbody>
<tr>
<td>5 Oct 2020</td>
<td>10 Jul 2021</td>
<td>Thursday Research Seminars</td>
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<tr>
<td>19 Oct 2020</td>
<td>26 Oct 2020</td>
<td>Data Management</td>
<td>Rob Ewers</td>
</tr>
<tr>
<td>22 Oct 2020</td>
<td>12 Nov 2020</td>
<td>Current topics in tropical ecology</td>
<td>Rob Ewers</td>
</tr>
<tr>
<td>4 Nov 2020</td>
<td>10 Mar 2021</td>
<td>Silwood Masters Workshops</td>
<td>Samraat Pawar</td>
</tr>
<tr>
<td>15 Jul 2021</td>
<td>9 Sep 2021</td>
<td>TFE Writing workshops</td>
<td>Rob Ewers</td>
</tr>
</tbody>
</table>

2.3 MODULE DETAILS

2.3.1 SILWOOD CAMPUS INTRODUCTION

Convenors: Amanda Ellis
Week: 1
Dates: 2020-10-05 to 2020-10-09
Courses: MSc EA, MSc EEC, MRes EEC, MRes eeChange, MRes TFE, MSc CMEE, MRes CMEE

2.3.1.1 DESCRIPTION

These are the campus-wide components of the induction week, common to all of the Silwood Park Masters programmes. You will be introduced to key teaching and administration staff. Presentations will demonstrate the range of research within the department and helps you to start thinking about possible topics for your research projects. The week also includes a number of important induction events.

2.3.2 INTRODUCTION TO THE MRES TROPICAL FOREST ECOLOGY

Convenors: Rob Ewers
Week: 1
Dates: 2020-10-05 to 2020-10-07
Courses: MRes TFE
2.3.2.1 DESCRIPTION

This module runs alongside the Campus Induction week and covers introductions to the course staff and to the specifics of the Ecological Applications programme. You will start the course by examining why tropical forests are important and their key processes.

2.3.3 FIELD ECOLOGY SKILLS

Convenors: Catalina Estrada
Week: 2
Dates: 2020-10-12 to 2020-10-16
Courses: MSc EA, MSc EEC, MRes EEC, MRes eeChange, MRes TFE

2.3.3.1 DESCRIPTION

In this module you will experience planning and implementing field research, become familiar with basic field research methods and learn about data management. You will also get familiar with the Silwood Park campus grounds fields and long-term experiments. The campus, with about 100 ha of land, is recognized as an important refuge for wildlife and has several types of natural habitats including grassland, wetland and woodlands. It is also an active place of field research, hosting multiple long-term experiments and study sites for global studies. The course will take place outdoors at the campus grounds or in a suitable area near you if are taking this course remotely.

2.3.3.2 AIMS

• Planning field research with emphasis on experimental design, time and data management
• Map reading and navigation
• General field sampling techniques
• Recording techniques and analysis of field data
• Taxonomic sorting and identification of common organisms
• Communicating your research

2.3.3.3 READING

These are reference book for designing and planning ecological work aiming to survey populations and communities in a variety of habitats:

• British Ecological Society (2018) Guides to better science: Data management. 37p Available at the British Ecological Society or Blackboard

This book chapter contains the history of Silwood Park grounds, ecosystems and research:

Check this link at Imperial College website to know more about Silwood long-term field studies: http://www.imperial.ac.uk/silwood-park/research/field-experiments/

2.3.3.4 MODULE DELIVERY

Lectures and resources for field practicals will be available online (Blackboard) and I expect to meet with you at least twice in live sessions using Microsoft Teams. Field activities are run in groups, so it is important that you check the module materials on Monday early morning of the week module, the latest.

2.3.3.5 ADDITIONAL INFORMATION

Please wear suitable clothes and footwear for outdoor activities and according with the weather forecast. Long trousers, waterproof footwear, waterproof coat, water, a charged mobile phone and a rucksack are recommended in Silwood Park.

2.3.4 BIOLOGICAL COMPUTING IN R

Convenors: Josh Hodge
Week: 3
Dates: 2020-10-19 to 2020-10-23
Courses: MSc EA, MSc EEC, MRes EEC, MRes eeChange, MRes TFE, MSc TBE, MRes Biosys

2.3.4.1 DESCRIPTION

In this week, you will learn how to use this freely available statistical software with strong programming capabilities. R has become tremendously popular in Biology due to several factors: (i) many packages are available to perform all sorts of statistical and mathematical analysis, (ii) it can produce beautiful graphics, and (iii) it has a very good support for matrix-algebra (you might not know it, but you use it!). So with R, you have an expanded and versatile suite of biological computing tools at your fingertips, especially for automating statistical analysis and the generation of figures. Therefore, R should become an indispensable component of your biological research workflow.

2.3.4.2 AIMS

• Learn how to use R for data exploration
• Learn how to use R for data visualization and producing elegant, intuitive, and publication quality graphics.
• Learn R data types and structures and control flows.
• Learn how to write and debug efficient R scripts and functions.
• Learn how to use R packages.

2.3.4.3 READING

• The Use R! series (the yellow books) by Springer are really good. In particular, consider: ‘A Beginner’s Guide to R’, ‘R by Example’, ‘Numerical Ecology With R’, ‘ggplot2’ (we’ll

- Ben Bolker’s ‘Ecological Models and Data in R’ is also very good.
- For more focus on dynamical models: Soetaert & Herman. 2009 ‘A practical guide to ecological modelling: using R as a simulation platform’.
- There are excellent websites. Besides CRAN, containing all sorts of guides and manuals, you should check out www.statmethods.net and en.wikibooks.org/wiki/R_Programming and google ‘R Graph Gallery’ for various sites showing graphing options and code.

2.3.4.4 MODULE DELIVERY

Lecture recordings will be provided online asynchronously. Practicals, where students get hands-on support (in a socially distanced way), will take place in-person in Silwood Park. Student groups may be formed and rotated to ensure compliance with social distancing. All practicals will also have a live remote option for students who cannot take part in person. Asynchronous Q&A sessions will take place to allow ample opportunity for any further student questions.

2.3.5 STATISTICS IN R

Convenors: Julia Schroeder  
Week: 4  
Dates: 2020-10-26 to 2020-11-03  
Courses: MSc EA, MSc EEC, MRes EEC, MRes eeChange, MRes TFE, MSc CMEE, MRes CMEE, MSc TBE, MRes Biosys

2.3.5.1 DESCRIPTION

In this week we will build upon the introduction to R you received in "Biological computing in R" week and learn to apply a core set of statistical methods that are of wide use in research projects. These statistical tests will form the basis for any data analysis you will do in the future. This week consists of short lectures and a range of longer practicals that you will have to work on by yourself, interactively with large or small groups. There will be the opportunity to byo – bring your own data – and discuss different ways of analysing the same question. Practicals will not only involve running statistical analyses, but importance is also placed on biological interpretation.

2.3.5.2 AIMS

In this week you will learn how to use statistics to better understand ecology, evolution and conservation. You will learn to apply and interpret the results of parametric tests, including descriptive statistics, t-test, correlations, and linear models.

2.3.5.3 READING
There are a wide range of introductory books for R. See later statistics and computing modules for more specialist texts but, for this week, the following are good introductory and reference texts that are available in Silwood library and as an e-book through Imperial:


### 2.3.5.4 MODULE DELIVERY

Lecture recordings will be provided online asynchronously. Practicals, where students get hands-on support (in a socially distanced way), will take place in-person in Silwood Park. Student groups may be formed and rotated to ensure compliance with social distancing. All practicals will also have a live remote option for students who cannot take part in person. Asynchronous Q&A sessions will take place to allow ample opportunity for any further student questions.

### 2.3.6 SPATIAL ANALYSES AND GEOGRAPHIC INFORMATION SYSTEMS (GIS)

**Convenors:** David Orme  
**Week:** 5  
**Dates:** 2020-11-04 to 2020-11-06  
**Courses:** MSc EA, MSc EEC, MRes EEC, MRes eeChange, MRes TFE, MSc CMEE, MRes CMEE, MSc TBE

#### 2.3.6.1 DESCRIPTION

This module will teach key skills in using and handling GIS data, along with core concepts in GIS and remote sensing. We will look at creating and georeferencing both vector and raster data and how to use GIS tools to create a workflow to carry out simple analyses. We will primarily be using R for data manipulation and analysis: you will already be familiar with R by this stage and it provides an open-source, scriptable and powerful engine for GIS. We will touch on the use of QGIS as a graphical interface for GIS that is better for data display.

#### 2.3.6.2 AIMS

At the end of this module you should have:

- Familiarity with a range of GIS data types
- Confidence in obtaining and handling GIS data
- Practical experience in creating maps
- Be able to perform basic data analyses and hypotheses testing in the spatial domain

#### 2.3.6.3 READING

- **Core text:** Geocomputation in R [https://bookdown.org/robinlovelace/geocompr/](https://bookdown.org/robinlovelace/geocompr/)
Population genomic data contain valuable information on how species relate to each other and how they evolved and adapted to their environment. As such, the study how genetic diversity within species is central to addressing many questions in evolution, ecology, and conservation. New sequencing technologies allow for the generation of large-scale genomic data which are pivotal for an understanding of population processes at deep resolutions. The goal of this module is to introduce students to the types of questions that can be addressed with population genomic data, and the theory and computational methodologies that are available for answering these questions.

This module provides an understanding of:

1. genomic data collection methods, and how to choose the data collection technique most appropriate to your question.
2. the wealth of data available to biologists in public genomic databases.
3. how genetic structure develops within and between populations and how to characterise it.
4. how demographic history affects genomic variation, and how to infer past population expansions and contractions from genomic data.
5. how migration affects genomic variation, and how patterns of gene flow can be inferred from genomic data.
6. how natural selection affects genomic variation, and how selection can be identified from genomic data.


The content will be provided via online lectures and practicals. Lectures will be either live and recorded. Additionally, there will be recordings for preparatory and advanced material. If allowed, some lectures and practical sessions will be delivered in person. Nevertheless, the online material will be available to all and will cover all content.
2.3.8 PLANNING RESEARCH PROJECTS

Convenors: Rob Ewers
Week: 7
Dates: 2020-11-17 to 2020-11-20
Courses: MRes TFE

2.3.8.1 DESCRIPTION

Adequate planning preparation is a key step towards successfully conducting field work projects in an international setting. This element will walk you through the steps involved in planning a project, beginning with how you develop and present a project idea, how you budget for the field costs, how you identify when you need animal ethics approval, and how you go about conducting risk assessments.

2.3.8.2 AIMS

At the end of this module, you should:

- Be aware of what is required in a project proposal and gain experience in preparing a proposal
- Develop appropriate methods for collecting and managing field data
- Be able to accurately budget for field work activities
- Be aware of health and safety requirements in field work
- Be aware of animal ethics legislation and requirements in relation to field work

2.3.9 ENERGY, WATER AND PLANTS

Convenors: Colin Prentice, Wouter Buytaert
Week: 8
Dates: 2020-11-23 to 2020-11-27
Courses: MRes eeChange, MRes TFE

2.3.9.1 DESCRIPTION

This module aims to convey knowledge of the key principles of environmental physics, climatology and hydrology as they influence and interact with terrestrial ecosystems. Material covered includes the standard model for photosynthesis and the nature of the coupling between energy, water and CO2 exchanges at the scales from leaf to catchment. The module will begin by introducing students to the fundamentals of the Earth’s climate system and how it generates the observed climate zones; proceed to consider processes by which soils, climate and plants interact; and end by showing how these processes bring about the observed spatial distribution of primary production and vegetation. A class exercise will serve the function of ‘bringing to life’ quantitative approaches to estimating fluxes of energy, water and CO2 between ecosystems and the atmosphere through hands-on group work.
2.3.9.2 AIMS

The students will acquire an understanding of:

- The principles of climatology and meteorology including atmospheric structure, the Earth’s energy balance, energy transport in the atmosphere, drivers and patterns of atmospheric motion, and the major wind belts and climatic zones
- The principles and practice of ecohydrology, including the components of the catchment water balance, the role of soil water storage in supporting primary production, key processes determining rates of transpiration and interception, and the main approaches to the estimation of evapotranspiration
- The fundamentals of hydrochemistry, including geochemical concepts in hydrology, interactions between subsurface and stream water, water isotopes, and geochemical and isotopic tracers of hydrological processes and water movement
- Plant carbon and water exchanges, including plant hydraulics and the soil-plant-atmosphere continuum, stomatal control of water and CO2 exchange, the energy balance of leaves and canopies, the biochemical controls of photosynthesis, carbon isotopes, plant water and carbon economies, and the effects of CO2 concentration on plants
- Global patterns of vegetation and primary production, including how climate determines vegetation structure and function, how satellites monitor vegetation properties, eddy covariance data on water and CO2 exchanges, and the basics of ecosystem modelling

2.3.9.3 READING


2.3.10 BIOGEOCHEMISTRY - TBC

Convenors: TBC
Week: 9
Dates: 2020-11-30 to 2020-12-04
Courses: MRes eeChange, MRes TFE

2.3.10.1 DESCRIPTION

This element will give an introduction to biogeochemical cycles at the global and ecosystem scales, with a particular focus on the carbon cycle.

2.3.10.2 AIMS

By the end of the module, you will have gained an understanding of:
• The main biotic and abiotic drivers of global biogeochemical cycles.
• The various sources of data and information about the global carbon cycle, past and present. The nature of the anthropogenic perturbation of the carbon cycle, and its interactions with other biogeochemical cycles.
• The key findings from enhanced CO2 experiments at the plant and ecosystem scales.
• The fate of anthropogenic CO2.

2.3.10.3 READING

2.3.11 BIODIVERSITY

Convenors: Rob Ewers
Week: 10
Dates: 2020-12-07 to 2020-12-10
Courses: MRes TFE

2.3.11.1 DESCRIPTION
There are hundreds of different ways to measure biodiversity, and some of them are more right than others. This element will provide the background knowledge and practical skills needed to quantify and compare the biodiversity of different samples and sites.

2.3.11.2 AIMS
On completing this element, you should have:
• Understanding how a range of biodiversity indices are calculated
• Experience in quantifying and comparing the diversity of samples

2.3.11.3 READING

2.3.12 CHRISTMAS READING WEEK

Convenors: None
Week: 11
Dates: 2020-12-14 to 2020-12-19
Courses: MSc EEC, MRes TFE, MSc TBE
2.3.13 WINTER BREAK

Convenors: None
Week: 12
Dates: 2020-12-21 to 2021-01-09
Courses: MSc EA, MSc EEC, MRes EEC, MRes eeChange, MRes TFE, MSc CMEE, MRes CMEE, MSc TBE, MRes Biosys

2.3.14 FIELD COURSE PLANNING

Convenors: Rob Ewers
Week: 15
Dates: 2021-01-11 to 2021-01-15
Courses: MRes TFE

2.3.14.1 DESCRIPTION

Adequate planning preparation is a key step towards successfully conducting field work projects in an international setting. This element will take you through three mini-project planning case studies. You will work as a group to examine and summarise the state of knowledge on an ecological topic, use that summary to guide the development of a question and a falsifiable hypothesis, and plan the field and statistical methods needed to test the hypothesis. These plans will then be implemented during the field course.

2.3.14.2 AIMS

On completing this element, you should be able to:

- Summarise state of scientific knowledge on ecological topics
- Identify gaps in scientific knowledge
- Formulate falsifiable hypotheses to test ecological questions
- Design appropriate field sampling and experimental procedures
- Work as a group member to share tasks and information

2.3.15 GENERALISED LINEAR MODELS

Convenors: Julia Schroeder, Josh Hodge
Week: 16
Dates: 2021-01-18 to 2021-01-22
Courses: MSc EA, MSc EEC, MRes TFE, MSc CMEE, MSc TBE

2.3.15.1 DESCRIPTION
This module builds on the basic linear models introduced in the previous term to introduce some key concepts that allow linear models to be applied to a wider range of research problems. This will include using generalised linear models to handle count and binomial data - where residuals are not expected to follow a normal distribution - and the use of structured models to allow for non-independence in data and to control for known sources of variation in data.

2.3.15.2 AIMS

You will learn how to analyse and interpret linear models, linear mixed models, general linear models and generalised linear mixed models. You will be able to apply and choose the right model for your question and data, and you will be able to assess which variables to model as random or fixed factors.

2.3.15.3 READING


2.3.15.4 MODULE DELIVERY

Lecture recordings will be provided online asynchronously. Practicals, where students get hands-on support (in a socially distanced way), will take place in-person in Silwood Park. Student groups may be formed and rotated to ensure compliance with social distancing. All practicals will also have a live remote option for students who cannot take part in person. Asynchronous Q&A sessions will take place to allow ample opportunity for any further student questions.

2.3.16 ADVANCED STATISTICS

Convenors: Josh Hodge
Week: 17
Dates: 2021-01-25 to 2021-01-29
Courses: MSc EEC, MRes TFE, MSc TBE

2.3.16.1 DESCRIPTION

This module will present a series of single day workshops by members of staff on the use of the particular statistical techniques used in their research. The week aims to build familiarity with more complex statistics and with using R and to introduce a wider range of statistical methods that may be of use in projects and in later research.

Each day will introduce the research need for the methods, describe how the method is applied and then use research data to learn the use of the method in practice.
2.3.16.2 MODULE DELIVERY

Lecture recordings will be provided online asynchronously. Practicals, where students get hands-on support (in a socially distanced way), will take place in-person in Silwood Park. Student groups may be formed and rotated to ensure compliance with social distancing. All practicals will also have a live remote option for students who cannot take part in person. Asynchronous Q&A sessions will take place to allow ample opportunity for any further student questions.

2.3.17 PROJECT PREPARATION

Convenors: Rob Ewers
Week: 18
Dates: 2021-02-01 to 2021-02-05
Courses: MRes TFE

2.3.17.1 DESCRIPTION

This module is set aside for you to prepare for travelling overseas to conduct field work. It provides opportunity for you to develop detailed work plans for your time away, to develop data collection forms, and to assemble all of the field equipment you will need.

2.3.18 TROPICAL FIELD COURSE

Convenors: Rob Ewers
Week: 19
Dates: 2021-02-08 to 2021-02-26
Courses: MRes TFE

The information below explains how the field course operates in normal circumstances. We do not, however, expect to be able to run a tropical field course this year. Instead, we will be offering replacement activities based in UK environments. For information about these replacement activities, see section 1.5.2 COVID-19 CONTINGENCY PLANS.

All information given below describes a Pre-COVID19 situation

2.3.18.1 DESCRIPTION

This field course will embed you within the research environment of the Stability of Altered Forest Ecosystems (SAFE) Project (www.safeproject.net). It will provide you with hands-on experience in:

- Generating hypotheses
The course will be structured around a set of three group projects. For each project, the class will: discuss a research question with a researcher currently working at SAFE; develop that question into a testable hypothesis; design the collection of field data to test that hypothesis; prepare a day-by-day work plan to ensure all the required data is collected; design and prepare digital data collection forms; project-manage the collection of the data over the period of the course; and collate the field data and metadata into a format appropriate for inclusion in the SAFE Project online database. You will then be expected to conduct basic analyses of the data and present your findings in short write-ups.

We expect that the data you collect will be of a quality high enough to be published, either as group-authored stand-alone dataset(s), and in exceptional cases as a research publication. In all cases, all class members are included as authors on these concrete, scientific outputs that can be added to your CV. Successful past examples of these publications include:


2.3.18.2 READING

The exact reading you will need will depend on which researchers we interact with in the field, and they will be expected to provide pdfs or hard copies to you out there, but the following two papers give an overview of the SAFE Project and an insight into the breadth of data being collected at the site.


2.3.18.3 ADDITIONAL INFORMATION

2.3.18.4 LOCATION
The field course will be based at the SAFE Project field site and at the Maliau Basin Field Centre. Both are located in Sabah, Malaysia. The nearest city is Tawau, which is about a two and a half and four and a half hour drive from the airport to SAFE and MBFC respectively.

Maliau Basin is where the SAFE Project has its primary forest control sites, but the actual SAFE Project fragmentation experiment is situated midway between Tawau and Maliau. We will take several days to visit the experiment, and some projects will be conducted in the logged and fragmented forests there rather than in the primary forests of Maliau.

2.3.18.5 PHYSICAL AND MENTAL CHALLENGES

Working in the rainforest is a tough environment – both physically and mentally. Access to many sites requires 4WD driving on rough roads and long, arduous treks in hot, humid conditions. Parts of these treks will be beneath a forest canopy, but other parts will be in the open along abandoned roads and old logging trails. Depending on the sites that are selected for study, simply getting to and from the sites can take as much as two hours from leaving camp to arriving at the site, and that is not counting the time and energy required to then conduct the field work itself and return to camp at the end of the day. Field days are often tiring, and it can sometimes take a lot of mental effort to generate enough enthusiasm for the next day.

You will need a good level of fitness to fully participate in all activities, and good mental health is an advantage. If you are concerned about your physical or mental ability to successfully participate on the course, we advise you to raise the issue with either Prof. Ewers or the Postgraduate Tutor Dr. Julia Schroeder. We will work with you to develop coping strategies and ensure you have the support you need to complete the course.

You will choose which sites to visit to collect data during the field course, and working in groups you will be responsible for deciding which students will visit which site(s) on which day(s). To help with this planning process, we will provide advice about the degree of accessibility of different sites. Once in the field, these plans can (and almost certainly will) be adapted, which is part of the practical experience in project management we provide on this course. This flexibility allows students that struggle with the conditions – physically or mentally – to be provided additional rest days or allocated research at sites that are easier to reach.

We will provide you with opportunities to learn more about the challenges of working in tropical forest environments, and the SAFE Project site in particular, through open discussions and Q&A sessions. These sessions will be held with members of Prof. Ewers’ research group, including some or all of past MRes Tropical Forest Ecology students, PhD students and postdoctoral researchers with extensive experience of working in these conditions.

2.3.18.6 CULTURE AND ETIQUETTE

Malaysia is a predominantly Muslim country and Sabahan society, like the rest of Malaysia, remains culturally and socially conservative. Most of the people you will interact with while you are in Sabah come from culturally conservative backgrounds. There may be situations when what you consider as being perfectly normal behaviour will diverge from their norms and could become a source of misunderstanding and discomfort for both you and them.
When in Malaysia, you are required to abide by Malaysian laws, and to respect the cultures, customs and norms of the people of Malaysia. To help you navigate this, you are expected to read the cultural guidance notes developed by the South East Asian Rainforest Research Partnership. These cover issues including dress code, alcohol, relationships, and Syariah Law. They are not intended to curb your basic rights, including those of self-expression; rather to highlight cultural differences and provide constructive advice on how you can have a safe, happy and successful experience in Sabah.

https://www.searrp.org/scientists/culture-and-etiquette/

2.3.18.7 ASSESSMENT

You will be expected to write short accounts of the three field projects conducted during the course. These should be a maximum of three sides of A4 each (double-spaced), and can be either typed or hand-written. The purpose is to give you practical experience and a large set of feedback on basic construction of hypotheses and reporting of scientific and statistical results.

2.3.18.8 LOGISTICS, VISAS AND COSTS

The costs for travelling to and from the UK, and the field course itself, are embedded within the course fee. We will arrange the flights for all students on the course. Students attending field courses in Malaysia enter the country as tourists, and most nationalities are able to obtain tourist visas on entry to Malaysia that cover the duration of the course. There are, however, nation-to-nation differences in entitlements, so you will be expected to check the eligibility requirements for your own nationality prior to travelling. We will work with you to obtain the necessary visas should you be ineligible for a visa on entry.

2.3.18.9 TIMETABLE

Flights to and from Tawau course won’t be booked until one or more months after the course starts, which is the date at which we have a finalised course list and when we will begin to have a reasonable idea of which students will be staying on in Sabah to conduct their project work. Because of this, the exact date on which we leave will not be known until the course is underway, but we will assemble in Tawau at the beginning of the fifth week of term in the New Year.

There is no pre-set, day-by-day timetable for the field course. Exact activities will depend on a range of factors, including weather conditions, the amount of time needed for particular projects, and the field plans that you generate in the field course planning module. As a general outline, however, the plan for the field course is as follows:

<table>
<thead>
<tr>
<th>Date</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 Feb 20</td>
<td>Arrive in Tawau</td>
</tr>
<tr>
<td>9 Feb 20</td>
<td>Travel to SAFE</td>
</tr>
<tr>
<td>10-14 Feb 20</td>
<td>Project 1</td>
</tr>
<tr>
<td>15-19 Feb 20</td>
<td>Project 2</td>
</tr>
<tr>
<td>20 Feb 20</td>
<td>Transit to Maliau</td>
</tr>
</tbody>
</table>
21 Feb 20 Free day
22-26 Feb 20 Project 3
27 Feb 20 Transit to Tawau
28 Feb 20 Depart Malaysia

2.3.19 TFE MRES PROJECT

**Convenors:** None  
**Week:** 22  
**Dates:** 2021-03-01 to 2021-08-28  
**Courses:** MRes TFE

2.3.20 FREEC SYMPOSIUM

**Convenors:** None  
**Week:** 49  
**Dates:** 2021-09-07 to 2021-09-09  
**Courses:** MSc EA, MSc EEC, MRes EEC, MRes eeChange, MRes TFE, MSc CMEE, MRes CMEE, MSc TBE, MRes Biosys

2.3.21 PROJECT VIVAS

**Convenors:** None  
**Week:** 50  
**Dates:** 2021-09-13 to 2021-09-17  
**Courses:** MSc EA, MSc EEC, MRes EEC, MRes eeChange, MRes TFE, MSc CMEE, MRes CMEE, MSc TBE, MRes Biosys

2.4 SERIES MODULE DETAILS

2.4.1 THURSDAY RESEARCH SEMINARS

**Convenors:** None  
**Dates:** 2020-10-05 to 2021-07-10  
**Courses:** MSc EA, MSc EEC, MRes EEC, MRes eeChange, MRes TFE, MSc CMEE, MRes CMEE

2.4.1.1 DESCRIPTION

This is a research seminar series that runs at Silwood Park. It runs on Thursdays 13.00 and seminars are typically presented by visiting academics. Masters students are expected to attend these seminar series – they will expose you to a much greater breadth of relevant topics and potential project ideas than happens within a single course.
2.4.2 DATA MANAGEMENT

Convenors: Rob Ewers  
Dates: 2020-10-19 to 2020-10-26  
Courses: MRes TFE

2.4.3 CURRENT TOPICS IN TROPICAL ECOLOGY

Convenors: Rob Ewers  
Dates: 2020-10-22 to 2020-11-12  
Courses: MRes TFE

2.4.3.1 DESCRIPTION

This element consists of weekly discussion sessions based around one or more recently published papers in tropical ecology. The topics and papers will be sent at least one week in advance, and you will be asked to make suggestions of papers that will match your interests. You will read the papers in advance of the session, and one or two students per session will be asked to summarise and present that paper to the group. We will then discuss the paper in detail, paying particular attention to issues such as the validity of the hypotheses being tested, the rigour of the methods and analysis used to address the hypotheses, and the way the authors have interpreted their data and statistics.

2.4.3.2 AIMS

Develop critical reading skills; Develop ability to concisely summarise and communicate scientific information; develop understanding of key issues in tropical ecology

2.4.4 SILWOOD MASTERS WORKSHOPS

Convenors: Samraat Pawar  
Dates: 2020-11-04 to 2021-03-10  
Courses: MSc EA, MSc EEC, MRes EEC, MRes eeChange, MRes TFE, MSc CMEE, MRes CMEE

2.4.4.1 DESCRIPTION

A Workshop series focused on Project management and Job/PhD application skill sets

2.4.4.2 READING

2.4.5 TFE WRITING WORKSHOPS

Convenors: Rob Ewers  
Dates: 2021-07-15 to 2021-09-09  
Courses: MRes TFE
2.4.5.1 DESCRIPTION

Writing workshops are embedded within Prof. Ewers’ research group, consisting of PhD students, postdoctoral researchers and Masters students from other courses. These workshops give hands-on experience in editing scientific writing, while providing an opportunity for you to obtain feedback on your own writing, including drafts of your thesis project and presentation slides. In the workshops, group members submit written content they want feedback on, most commonly including text, figures and slides. All group members spend around 30 minutes editing and commenting on one or more items, after which we hold a group discussion going through and analysing those edits. These discussions will introduce you to topics beyond the immediate scope of the taught content on the course, and give insight and practical tips on how to best present and communicate scientific information.

2.4.5.2 AIMS

At the end of this element, you should: • Have advanced scientific writing skills; Have practical experience editing scientific writing; Understand the basics of good graphing and data presentation

3 COURSE SPECIFIC REGULATIONS

3.1 RESEARCH PROPOSALS

The format for this assessment follows what is required by the Maliau Basin Management Committee to conduct research at the SAFE Project. I’ve chosen this format to save you time: writing it this way means you can use the proposal for submitting to MBMC to obtain research permission without having to make any changes.

You should prepare a proposal that MUST contain the following elements:

• Project Title
• Introduction (max 300 words)
• Objectives (200 words)
• Problem statement (100 words)
• Literature review (500 words)
• Methods (500 words)
• Work schedule/timeline (Gant chart)
• Expected outcomes (300 words)
• References
• Budget (table)
  o This should have columns for: item, quantity, unit price, total price, source of quotation
  o It should have a total cost at the bottom
  o It should indicate project funds available to demonstrate where the money will come from (e.g. course budget; supervisor budget; personal budget)

• Equipment list (table)
  o This should have columns for: item, quantity, data it will generate

You will need to submit an electronic version on Blackboard, a hard-copy to the teaching office.

3.2 RESEARCH PROJECTS

**We do not expect to be able to offer tropical field projects this year.** Instead, we will be offering field projects in UK environments or projects analysing pre-existing data collected from tropical environments. For information about our contingency plans for research projects, see section 1.5.2 COVID-19 CONTINGENCY PLANS.

You will carry out an independent research project leading to a written report (dissertation). The project must have at least one supervisor from the Department of Life Sciences at Imperial College. You can have supervisors from external institutions or other departments at Imperial, but you will still need to have an internal supervisor whose role is to ensure all students obtain consistent levels of supervision throughout their project.

The Silwood Park Campus Student Guidebook contains a considerable amount of information on how you should go about finding a project and supervisor, and how you should structure your approach to successfully completing your project.

3.2.1 A TIMELINE FOR SUBMITTING PROJECT PAPERWORK

It is impossible to work in a foreign country without encountering paperwork; being enrolled on a tropical ecology course does not exempt you from the need to prepare that paperwork. The course is timetabled to give you enough time to get all of the necessary paperwork completed and submitted in advance of leaving the UK for the field course in January. **WE ARE UNABLE TO SUBMIT PAPERWORK IN YOUR NAME.** It is, therefore, your responsibility to ensure all of the documents you need to have submitted get submitted.
3.2.2 HEALTH AND SAFETY

If your project involves doing fieldwork then you will need to meet Imperial’s guidelines for working abroad. College has a streamline process to make this as easy as possible, but you need to give them time to process your application. This is particularly important for the medical side of things – if you will be working somewhere that requires vaccinations, Imperial will provide them for you but you need to leave adequate time to ensure you’re able to complete the full course of treatment.

Details of the process can be found here:

- Occupational Health website (vaccines, malaria tablets, etc)  
  http://www3.imperial.ac.uk/occhealth/guidanceandadvice/traveladviceandvaccination

  You will need to book an appointment with Occupational Health where they will discuss, and arrange to provide, any vaccinations and prophylactics that you should be taking. Note that they sometimes advise against taking malaria prophylaxis at the field course sites in Maliau Basin and SAFE Project. You should argue with them about this – we have had several cases of malaria at these locations and it is important you take the threat seriously.

- Risk Assessment and Emergency Response Protocol forms can be found here:  
  http://www3.imperial.ac.uk/safety/subjects/offsiteworking1/fieldworkriskassessment

  For those of you working at SAFE, we will provide you with examples of both forms that you can more or less copy, depending on what you are working on.

The Risk Assessment itself is formally assessed as part of your coursework, ensuring you get maximum value out of the effort put into developing health and safety protocols for your particular project.

3.2.3 RESEARCH PERMITS

Depending where you end up doing your project, you will almost certainly have to apply for research permits. Most projects by TFE students are conducted in tropical nations, and almost all of those nations will require you to submit applications to do research and, in some cases, to also apply for a research visa. It is incumbent on you to ensure you abide by the laws of the country you are working in.

Your project supervisor will work with you to determine the appropriate visas needed for your research, and to obtain the necessary permissions. Where required, your supervisor will also help put you in touch with appropriate researchers to act as local collaborators on research permit applications, which is required in many nations.

For context, the steps required to get all the permissions required to conduct research at SAFE takes up quite a large section of the internet – see
https://www.safeproject.net/info/steps_to_follow. We will guide you through this process and streamline it to the extent possible, but it remains your responsibility to ensure you have all the appropriate documentation in place before beginning your research.

### 3.2.4 TIMETABLE

Below is a rough timetable you should work towards to ensure everything is in place in time to start your project. The deadlines here are approximate, and take into account the fact that you will be in Malaysia for January attending the field course. The timetable assumes you will be conducting your research project at SAFE, so you will need to adapt it accordingly if you are working elsewhere.

<table>
<thead>
<tr>
<th>Date</th>
<th>Item</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 November</td>
<td>Confirm your project</td>
<td>Look at as many project ideas, and talk with as many potential supervisors, as you can before making this decision, but make sure you have decided on a project by now to give yourself plenty of time to prepare.</td>
</tr>
<tr>
<td>01 November</td>
<td>Imperial Travel Health Questionnaire</td>
<td>This should leave enough time to complete any courses of vaccinations you require. Make sure you include Malaysia (for the field course) as well as whatever country you will be conducting your project in.</td>
</tr>
<tr>
<td>14 November</td>
<td>Register for Imperial travel insurance</td>
<td>Imperial provides travel insurance for your College-related activities abroad, but you must register your trip in advance.</td>
</tr>
<tr>
<td>25 November</td>
<td>Imperial Fieldwork Risk Assessment</td>
<td>This is your assessed Risk Assessment, which will also be submitted to Imperial as part of the process of obtaining permission to work overseas.</td>
</tr>
<tr>
<td>25 November</td>
<td>Maliau Basin Management Committee (MBMC)</td>
<td>Required to conduct research inside the Maliau Basin Conservation Area – a protected area that is where SAFE’s control sites are located.</td>
</tr>
<tr>
<td>05 December</td>
<td>Maliau Basin Management Committee (MBMC)</td>
<td>Also required before you are able to apply to SaBC for an Access License to conduct research in Sabah.</td>
</tr>
<tr>
<td>05 December</td>
<td>Project proposal</td>
<td>This is your assessed project proposal, which will also get submitted to Maliau Basin Management Committee as part of your research visa application.</td>
</tr>
</tbody>
</table>
You will also need to upload it to the SAFE Project website, where it will be distributed to past and present researchers at SAFE to ensure what you are planning does not interfere with work that is already happening. Once accepted, your proposal will be added to the SAFE website.

https://www.safeproject.net/info/steps_to_follow

09 December Imperial College Ethics Approval

Required if you’re working on vertebrates (including conducting social surveys and questionnaires on people). Those of you working on mammals or fish at SAFE will be embedded within a group application under my name, rather than have to do this individually.

http://www.imperial.ac.uk/research-ethics-committee/

14 December SAFE Project Researcher Key Information Form

Goes to the SAFE Project personnel onsite to ensure they have all relevant emergency contact details.

https://www.safeproject.net/info/steps_to_follow

20 December Sabah Biodiversity Centre (SaBC) Access License

Most of you that work at SAFE will be embedded within a group application under my name, rather than have to do this individually.


20 December Sabah Biodiversity Centre (SaBC) Export License

Only necessary if you plan to export samples out of Malaysia


01 February Apply for Visitor Pass Professional Visa

You will need to pick up your approved Access License from SaBC, collect forms from the Immigration Department, fill in those forms, visit and get your Local Collaborator to fill in their sections of the forms, and take them back to the Immigration Department for processing.

https://www.safeproject.net/info/steps_to_follow

14 February Collect Visitor Pass Professional Visa

The visa takes 14 days to be processed before you are able to get the stamp in your passport that confirms your right to conduct research in Sabah.

For those of you working at SAFE, there are a few extra details to keep in mind:

- You have it easy – we have a great deal of experience in this process and will guide you through it as a group step-by-step.

- You must read and follow the instructions from SAFE’s website: https://www.safeproject.net/info/steps_to_follow. Just because Prof. Ewers is the Science Director at SAFE and you’re working there under his guidance does not mean you can ignore the requirements that apply to everyone using the site.
• MBMC application forms are all done individually, but you will almost certainly apply to SaBC as one member of a group application that will include Prof. Ewers, his postdocs and PhD students, as well as yourself and other MRes and MSc students working at SAFE.

• You will require a Local Collaborator and a letter from the Sabah Forestry Department to apply for MBMC and SaBC licences. We will arrange these for you.