Imperial College London

Ecology, Evolution & Conservation Masters in Research (EEC MRes)

Programme Guidebook: 2020 – 2021

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Table of Contents

This Guidebook provides you with course specific information. However, for you to successfully undertake your MRes you will also need to refer to the *Silwood Masters Guidebook* which contains important details for course completion, including:

Introduction to the department
Key contacts can be found in the Student Guidebook.

Academic regulations
The EEC MRes course specific regulations are provided in this Guidebook, but the Student Guidebook provides information about the general regulations. This includes academic integrity, plagiarism, employment during your studies and complaint and appeals procedures.

Welfare and advice
Imperial has a wide support network for students. The Student Guidebook provides details of the available support and key contacts and links.

Student feedback and representation
We are very grateful for feedback on the course. There are a range of options for providing feedback and getting support on your academic studies and the Student Guidebook provides details.

Research project report (thesis) guidelines
How to prepare your thesis, including structure, word limits, formatting, etc.

Project and supervision guidelines
How to choose a project, student research budgets, what to expect (and not to expect!) from supervisors.

FrEEC Symposium
All about the student-run Frontiers in Ecology, Evolution & Conservation Symposium (FrEECS) held September 2021. This applies only to your second (summer) project.

Electronic copies of the handbook and guidebook are available on the course website and on Blackboard. Copies can also be requested from the Course Administrator Amanda Ellis (amanda.ellis@imperial.ac.uk).

1. Course overview

For full time students, the course runs for one year from the start of October 2020 through to the end of September 2021. The taught components of the courses (first 6-weeks) typically start at 10.00 and finish by 16.30, but this can vary, and it is **important to check your emails daily in case of any unforeseen circumstances that may arise**. Details for each of the first 6 weeks are provided in this Guidebook, and an electronic timetable is provided on Blackboard.

Wednesday morning is either used for taught material or reserved for private study. Wednesday afternoons are typically reserved for sports, leisure activities or private study (but this may be subject to change on the odd occasion).

A research seminar series is held on Thursdays at 1pm by external academic researchers. There are often additional internal seminars throughout the year. **As a component of the course, you are expected to attend these research seminars.** Whilst the current intention is for seminars to be given in person at Silwood, changes to Covid-19 related restrictions may result in a set number of seminars being delivered remotely through platforms such as a live feed video call or webinar.

There is a monthly Silwood social seminar series held typically on the first Tuesday of each month, which is an opportunity for PhD students and postdoc researchers to present their work to a research audience. This is a great way to learn more about the research environment that you will be surrounding by over the next year and you can learn about the research of the group you may be joining as part of your projects. The seminar comes with free drinks and food, set in an informal environment. However, whilst the current intention is for seminars to be given in person at Silwood, changes to Covid-19 related restrictions may result in a set number being delivered remotely through a live feed video call and unfortunately no drink and food would be provided in this instance.

i)   The taught modules during the first 6 weeks will be a combination of on-campus (in-person) and remote learning (online), known as 'multi-mode' delivery. This will provide core concepts and skills through pre-recorded and live feed remote lectures and on site practicals under social distancing guidelines. The aim of this teaching is to provide you with key basic skills that can be used and improved upon when undertaking your assessed research projects. Teaching files and other course resources are usually provided on the online Blackboard virtual learning environment. Any remote live feed lectures or remote meetings will be undertaken through platforms such as Teams or Panopto. Paper copies of lecture notes and handouts are normally not provided. You will receive printing credit on your ID security card. We expect you to work full time during both, the taught and project components.

ii) The two (Winter and Summer) research projects (each running for 4-5 months) that follow, provide the opportunity to develop a larger piece of independent research, based either in a research group at Imperial College, or with another institution if you

choose. Many different types of projects will be advertised to the Masters student cohort and this will include field, lab and desk-based projects. Field and lab projects will be run in accordance with Covid related guidelines. If any worse case scenarios (such as a national lock-down) we will ensure that enough desk-based projects are available.

iii)   Please be aware that it is possible for projects, due to the nature of the experiments or data collection, to require out-of-hours work. For example, maintaining greenhouse experiments, catching birds early in the morning, feeding animals on the weekend, or running laboratory procedures that take longer than 8 hours. Out of hour work is not necessarily mandatory, but if you commit to a project that requires it, we expect it of you. Your performance counts towards your overall project mark. If you cannot commit to out of hours work for personal reasons, medical reasons or other commitments then we advise you to choose a project that does not require out of hours' work. Please confirm the expected working hours with the project supervisor before committing to a project.

iv)   Support will be provided during your two research projects. During the first Winter project period a number of drop-in sessions will be organised for you to gain information on how to approach your research projects, guidance on your analyses and writing, informal discussion about your progress on the course and any other questions you may have. There will also be support provided by the course director and a cohort of PhD students if you have questions concerning hypothesis testing, methodological design and data analyses. There will also be a course tutor available during a routine weekly slot for you to approach and ask for guidance in developing and undertaking your projects. Note, that the tutor is there to provide academic help and is not a counselling service, please see the Silwood Guidebook for details on this.

v)   For students wishing to carry out an external project (a project where you will be located at a non-Imperial institute), please be aware that you may not benefit as much from the support listed above due simply to geographical reasons.

MRes website
https://www.imperial.ac.uk/life-sciences/postgraduate/masters-courses/masters-in-ecology-evolution--conservation-msc-and-mres/
Blackboard e-learning website
http://bb.imperial.ac.uk

1.1 Course Administration

MRes Course Director	Dr Richard Gill (r.gill@imperial.ac.uk)
Postgraduate Administrator	Mrs. Amanda Ellis (amanda.ellis@imperial.ac.uk)
Senior Tutor Silwood	Dr Will Pearse (will.pearce@imperial.ac.uk)
Senior Tutor South Kensington	Dr Tony Southall (t.southall@imperial.ac.uk)
Director of Postgraduate Studies	Dr Kleoniki Gounaris (k.gounaris@imperial.ac.uk)

1.2 Course aims

Assessment of the student's knowledge base and intellectual ability is through the written report, presentation, viva voce and the supervisor's assessment report for each research project (winter project ending around mid-March (depending on Easter break) & summer project ending August/start of September). The overall mark for each project will then be equally weighted with each contributing 50% of the final mark. The average mark between the two project marks will represent your final grade. At the end of the year a subset of the students will also be examined by viva voce by visiting external examiners (dependent on Covid restrictions this may be done in person on site or remotely).

The *aims* of the EEC MRes is to:
• Develop an understanding of some of the fundamental principles underlying research in ecology, evolution and conservation.
• Provide broad training in research skills relating to ecology, evolution and conservation.
• Show how these principles and skills can be applied to solve real world problems facing the biosphere.
• Prepare students for a career in using research-based approaches to understanding biological processes that underpin the natural world
• Help to fill key evidence and knowledge gaps in evolution and ecology.
• Think about how to apply such knowledge to help target conservation action.
• Prepare students for higher level research positions, such as PhD studentships.
• Guide students to realise their areas of interest and research potential.

1.3 Learning Outcomes

Developing independent research skills to be able to solve outstanding questions in ecology and evolution, and use this information to inform conservation and mitigative actions.

Acquire knowledge and understanding of many of the following:
• Basic and applied aspects of theoretical ecology as it applies to population and/or community dynamics, and ecosystem function
• Modern evolutionary theory and the methods of phylogenetic reconstruction and genomics.
• Broad issues concerning conservation of the biosphere and biodiversity, from local to global scales.
• Ability to choose an appropriate ecological or evolutionary model to answer a particular question for conservation
• Ability to generate, analyse and interpret ecological and evolutionary data and databases met in conservation work
• The scientific opportunities within the Department of Life Sciences at Imperial College that can allow interdisciplinary approaches to addressing pressing issues in the natural sciences.

- Range of transferable skills including: communication skills (oral and written); project design, implementation and evaluation, team project coordination; computing, statistics and mathematical modelling; specific research skills.

Further knowledge-based skills:
- Basic and applied ecology as it relates to population and community dynamics and ecosystem function;
- Ecological models and their application to predict dynamics and guide population management;
- Evolutionary theory as it relates to the origins and dynamics of diversity;
- Methods of evolutionary analysis, especially molecular approaches for population studies and phylogenetics;
- Research techniques, including information retrieval, experimental design and statistics, modelling, sampling, molecular biology, laboratory and field safety;
- Detailed knowledge and understanding of the essential facts, concepts, principles and theories relevant to the student's chosen area of specialisation;
- Management and communication skills, including problem definition, project design, decision processes, teamwork, written and oral reports, scientific publications.

Experimental based skills:
- Analyse and solve ecological, evolutionary and practical conservation problems using an integrated multidisciplinary approach
- Integrate and evaluate information
- Formulate and test hypotheses using appropriate experimental design and statistical analysis of data
- Plan, conduct and write-up a programme of original research.
- Plan and execute safely a series of experiments
- Devise theoretical models for given problem and implement them in computer simulations
- Analyse experimental results and determine their strength and validity;
- Prepare technical reports;
- Give technical presentations;
- Use the scientific literature effectively;
- Use computational tools and packages.

Transferable skills:
- Communicate effectively through oral presentations, written reports and scientific publications;
- Apply statistical and modelling skills;

- Management skills: 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;
- Learn independently with open-mindedness and critical enquiry;
- Learn effectively for the purpose of continuing professional development.

1.4 Course assessments

Students following the EEC MRes are expected to attend the first 6 weeks of taught modules in the Autumn Term (whether on-site or remotely). Students may also request to respective module convenors if they would like to attend additional modules being run in the EEC MSc course (and possible other Masters courses). Note that Covid restrictions may determine what is available due to class sizes. **Attendance at research seminars is expected for all MRes students, unless you are conducting your project off-site.**

MRes students must complete *two* research projects: Winter project, running between November and March; and the Summer Project, running between April and September. **The projects must be with different supervisors.** We recommend undertaking projects that tackle different questions and require using different skills to provide you with an enhanced learning experience and broader skill set.

Assessment of the MRes is based solely on the two research projects (50% each). ***Details on research projects are provided in the Silwood Masters Guidebook, and will be covered in an introductory lecture and drop-in sessions by Richard Gill.***

Before you officially start a project, you must submit a 2-page project proposal with details and plans to the course director Richard Gill (r.gill@imperial.ac.uk). This plan is not part of your final mark, **but it will be assessed and is compulsory that the course director confirms the proposal meets the expected standard before projects can start**. The winter project proposal needs to be submitted by Monday **November 9th 2020**, the summer project proposal will not be required until early April 2021. Details on what is to be included in the proposal will be provided in an introductory lecture and shared.

Supervisor report on your research project performance (10% of one project mark)
Your project supervisor will assign a grade based on your performance over the course of the project, including any field, lab or desk-based research as well as how well you worked within a laboratory and/or group.

Research project report (60% of one project mark)
The research project must be completed and written up in the style and formatting of a scientific research paper.

Research project final presentation (10% of one project mark)
Each student will give a final conference-style presentation, and the performance will contribute to the final mark. This is presented in a lecture room on-site on a separate day to the viva. However, if Covid restrictions do not permit this, the presentation will be given remotely using a live video meeting with share screen function for 15mins immediately before the viva using the online platform Teams.

Research project viva (20% of one project mark)
Each student will have a 25-30 minute viva with two internal examiners and your performance in the viva will contribute to your final mark. This is conducted in a room with the two examiners on-site. However, if Covid restrictions do not permit this, the viva will be conducted remotely using a live video chat using the online platform Teams.

To pass the course, you must pass each project (i.e. a mark of 50% or higher).

FrEECS summer symposium
You will give your 'summer research project final presentation' at a graduate symposia. These are timetabled presentations, arranged as a mini-conference. For any career, but especially in research, it is important you get the opportunity to practice presenting your research, and this will be assessed by two internal examiners. The length of the presentation varies with the number of students and sessions held, but typically you can expect a 10 minute talk with 2-3 minutes of questions. The current plan is for this to be conducted as normal (presented in person on-site and with audience appropriately spaced), but if any changes to Covid restrictions occurs we will update you accordingly.

External vivas and examiners
A sample of students will undertake a final 15-20 minute viva with one of the External Examiners, to be held between the internal summer project viva and the final meeting of the Board of Examiners. We cannot predict who the subset of students will be until we have the marks for both projects. We therefore ask for all students to be available for the external examiners meeting which will be a couple of days after the final summer vivas. Although the external vivas are mandatory for all students, they *do not* form part of your assessment. These vivas form a part of the exam moderation process. As above Covid restrictions will determine whether this is undertaken on-site or remotely.

2. Expectations

2.1 What we expect from you during courses:

For the course to run successfully and smoothly, information flow needs to be kept up. We therefore expect you to be excellent communicators. To ensure this ***we expect you to read your imperial email at least daily, and reply if needed in a timely manner***. Late notices about changes to the course timetable can occur due to unforeseen circumstances.

A lot of the course content can be found on blackboard, in this handbook, and the Masters Student Guidebook. If you still cannot find an answer then email the Postgraduate administrator, or the course, or module convenors.

Attend the six-week taught course. If you are struggling do not hide it, but rather talk to one of us, a warden, or a tutor. We can often help.

2.2 What we expect from you during projects work:

- **Take responsibility for your projects, own them!** Become responsible for the success of your project. This begins with choosing a topic early on. Communicate well, and regularly, with your supervisors. Check your email regularly and ***reply in a timely fashion***. The goal of these Masters courses is that you turn into an independent researcher – to learn how to be independent you need to be pro-active, take initiative and feel responsible for your own projects. Your supervisors are here to help you accomplish this goal, but this is not a course where you will be spoon-fed. Furthermore, we also want you all become professionals – and thus we expect you to now already act like professionals.

- **Work hard, think for yourself, and take initiative.** Research cannot be accomplished with a lazy attitude. Imperial College is a top ranked university and we expect that you will strive for excellence. We give you the support you need to do this but you must come forward yourself if you hit a problem – we cannot magically know that you struggle.

- **Display initiative.** You are the person who drives and strives to understand your project topic better. We expect you to push your research forwards, and to be curious about science.

- **Expect hurdles and set-backs.** Research is, by definition, a venture into the unknown, and it involves a lot of trial and error. All projects will encounter unforeseen circumstances. This is inevitable when carrying out novel and exciting projects. Note that failed experiments and analyses are not necessarily reasons for a bad mark. We will assess you on your thinking, your approach and your effort rather than a specific result *per se*. Reaching out to others, talking about it, and being pro-active about finding ways to solve these problems will certainly help and ultimately, is what research is about.

- **Think critically** of science, and use these skills in being sceptical of results in the literature. Start discussions with your peers about these.

- **Think outside the box**. Learn to use your initiative to develop novel ways to address a problem.

- **Read relevant papers**. Search for relevant scientific papers, above and beyond the ones that your reading list suggests. A good routine to adopt is to read at least one paper every day, whether surrounding your topic or as outside reading.

- **Hone your writing skills**. Start writing parts of your thesis early on, and do not procrastinate writing. Writing usually should be revisited and edited over a number of rounds, as only through this kind of polishing does it achieve excellence.
- **Swap your essays with your peer and criticize each other's work**. This is an excellent activity to improve your writing skills. Your supervisor needs a certain amount of time to read and comment on your work.
- **Ask for feedback early**, and not in the last week before the hand-in deadline. Your supervisor will have more than your work to read, and you need some time to apply their comments.
- **Be an active part of your supervisor's research group**. That includes attending group meetings, talking with your colleagues about research, asking for help and helping others. Notify your supervisor or course director of unforeseen (and foreseen) periods of absence.
- **Learn from others research**. You can learn from other people's approaches and apply them to your questions and system. Attend the departmental seminars and the social seminars.

- Ask for help if needed. We have a large range of support and advice available to you (tutors, health care, career advice, student support, immigration and visa services, counselling services, disability advisory services, chaplaincy centre, English language support, financial advice) but it is important you let us know if you have any issues.

2.3 What you can expect from your project supervisors

- To be supportive of you both intellectually and personally
- To guide your thoughts in gaining a clear idea of the aims and objectives in your projects at the start of your project
- To provide a safe and adequate work environment
- To be available (or provide an identified substitute) to talk about your research problems
- To help and guide you, be a sounding board and help you develop your confidence in your own abilities and research skills, to enable you to learn to work more independently and to make independent decisions confidently
- To help develop your skills in technical writing, presentations, problem definition and solving, statistical analysis and critical thinking
- To help you to realize projects that you think of yourself if possible
- To read your report and make constructive comments on both style and intellectual content, given you provide it to us early enough before the submission deadline
- To expose you to scientific work of the highest quality, and give you all you need for you to become an excellent graduate

2.4 What is expected from all of us, students and academics:
- To adhere College policies and procedures
- To keep up research and academic integrity
- Be aware of safety procedures at all times.

3. Course details

3.1 Course Delivery Statement

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-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 setting

These teaching delivery statements apply to all course modules unless specific differences are noted under individual modules below.

COVID-19 safety: https://www.imperial.ac.uk/safety/safety-by-topic/laboratory-safety/biological-safety/covid-19-guidance/

https://www.imperial.ac.uk/about/covid-19/students/learning-experience/postgraduate-research/programme-details-for-academic-year-2020-21/mres-ecology-evolution--conservation-offer-holders/

3.2 Weekly module summary

Week	Starting	Module	Convenors
1	5 Oct 2020	Silwood Campus Introduction	Amanda Ellis
1	5 Oct 2020	Introduction to EEC MSc and MRes	Richard Gill, Julia Schroeder
2	12 Oct 2020	Field Ecology Skills	Catalina Estrada
3	19 Oct 2020	Biological Computing in R	Josh Hodge
4	26 Oct 2020	Statistics in R	Julia Schroeder
5	4 Nov 2020	Spatial Analyses and Geographic Information Systems (GIS)	David Orme
6	9 Nov 2020	Genomics and Bioinformatics	Matteo Fumagalli
7	16 Nov 2020	EEC MRes Winter Project	None
12	21 Dec 2020	Winter Break	None
25	22 Mar 2021	EEC MRes Winter Project Marking	None
26	1 Apr 2021	EEC MRes Spring Break	None
28	15 Apr 2021	EEC MRes Summer Project	None
49	7 Sep 2021	FrEEC Symposium	None

| 50 | 13 Sep 2021 | Project Vivas | None |

Series module summary

Start	End	Module	Convenors
5 Oct 2020	10 Jul 2021	Thursday Research Seminars	None
4 Nov 2020	10 Mar 2021	Silwood Masters Workshops	Samraat Pawar

3.3 Specific Project Start dates and deadlines

Winter Project Start Date: 16/11/2020

Winter Project Deadlines:

Fri 19/03/2021 Report submission by 13:00

Fri 26/03/2021 Presentation

Wed 31/03/2021 Viva

Summer Project Start Sate: 15/04/2021

Summer Project Deadlines:

26/08/2021 Report submission

7-9/09/2021 Presentation as part of the FrEECS

13-17/09/2021 Vivas + External Examiner meetings

Taught module descriptions

Descriptions of the content and learning objectives of the weekly lectures. The day-level timetables other than for the first week will be available through the iCalendar (AKA iCal) service after week one under: http://www.imperial.ac.uk/timetabling/view/icalendar

3.4 Module details

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

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 demonstrates 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.

Introduction to EEC MSc and MRes

Convenors: Richard Gill, Julia Schroeder
Week: 1
Dates: 2020-10-05 to 2020-10-07
Courses: MSc EEC, MRes EEC

Description

Two introductory lectures will run alongside the Campus Induction week and covers introduction to the course staff and to the specifics of the Ecology, Evolution and Conservation MSc and MRes programmes

Reading

Recent issues of: Trends in Ecology and Evolution/Ecology Letters

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

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.

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

Reading

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

- Wheater Cp, Bell JR & Cook PA (2011) Practical Field Ecology. Jhon Wiley & Sons, Inc. 362p. Available online with Imperial College libraries
- Sutherland WJ (ed) (2006) Ecological census techniques: a handbook. Second edition. Available online with Imperial College libraries Main document used for learning data management
- 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:

- Crawley MJ (2005) Silwood Park and its history. In: Crawley MJ, ed. The Flora of Berkshire. Harpenden, Hertfordshire, UK: Brambleby Books, 215–253.

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/

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.

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.*

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 T&B, MRes Biosys

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.

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.

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 see this in another week), 'A Primer of Ecology with R', 'Nonlinear Regression with R', 'Analysis of Phylogenetics and Evolution with R'.
- 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.

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.

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 T&B, MRes Biosys

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.

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).

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:

- Beckerman, Andrew P. and Petchey, Owen (2012) Getting Started with R : An introduction for biologists Oxford University Press.SEP
- Crawley, Michael J (2012) Statistics: An Introduction Using R. John Wiley.

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.

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

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.

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

Reading

- **Core text**: Geocomputation in R https://bookdown.org/robinlovelace/geocompr/
- GIS overview: Longley, PA (2011) Geographical information systems and science. Wiley.
- Coordinate systems: Van Sickle, G (2010) Basic GIS coordinates. CRC Press [https://www.dawsonera.com/abstract/9781420092325]

Genomics and Bioinformatics

Convenors: Matteo Fumagalli
Week: 6
Dates: 2020-11-09 to 2020-11-13
Courses: MSc EA, MSc EEC, MRes EEC, MRes TFE, MSc CMEE, MRes CMEE, MSc T&B, MRes Biosys

Description

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.

Aims

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.

Reading

Nielsen, Slatkin, 2013. An Introduction to Population Genetics: Theory and Applications. Oxford University Press, Oxford.

Module delivery

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.

EEC MRes Winter Project

Convenors: None
Week: 7
Dates: 2020-11-16 to 2021-03-19
Courses: MRes EEC

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 T&B, MRes Biosys

EEC MRes Winter Project Marking

Convenors: None
Week: 25
Dates: 2021-03-22 to 2021-03-31
Courses: MRes EEC

EEC MRes Spring Break

Convenors: None
Week: 26
Dates: 2021-04-01 to 2021-04-14
Courses: MRes EEC

Description

A break to relax before heading into your second project

EEC MRes Summer Project

Convenors: None
Week: 28
Dates: 2021-04-15 to 2021-08-26
Courses: MRes EEC

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 T&B, MRes Biosys

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 T&B, MRes Biosys

Series module details

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

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.

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

Description

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

Reading

For other modules running throughout the year that you may be interested in attending, please be proactive and look at the guidebooks for the other courses.