



WEEK 1: UNIVERSITY OF OXFORD
9-13 DECEMBER 2024

Welcome to Oxford!

Location: A map showing key locations for the week can be found on page 6 of this booklet.

Workshop registration: Registration for the APTS week will take place between 11:15–12:45 on Monday 9 December 2024 in the Ground floor social area, Department of Statistics (see Figure 1). You will receive your name badge from the registration desk. Please wear your badge at all times. This will help with security and also help you identify fellow participants.



Figure 1: Department of Statistics (left) and Lady Margaret Hall (right)

Check-in / Luggage: Check in at Lady Margaret Hall for residential guests is from 14:00 on 9th December although you are welcome to drop your luggage into the storage facility earlier in the day. The Porters will direct you to the storage facility. Check out is by 10:00 on 13th December. When checking out please return your key and fob to the Porters so they know your room is vacant. A luggage store will be available at the Department of Statistics on Friday morning.

Lunches and refreshments: All lunches will be taken in the Deneke Dining Hall at Lady Margaret Hall from 12.45 pm – 2.00 pm. All coffee breaks will be taken in the ground floor social area at the Department of Statistics. See timetable on page 7 for further details.

IT: You are encouraged, if possible, to bring a laptop with R installed for taking part in the Statistical Modelling lab sessions. The Statistical Computing module recommends the use of R and RStudio Desktop (the open-source, free version) for the labs.

There will also be a computer lab with 50 desktop computers available for the practical sessions.

Wi-fi: We strongly advise that you set up Eduroam beforehand using <https://cat.eduroam.org/>. Alternatively, OWL accounts (a central wireless service for both University Members and Visitors) will be available at registration but please note you will need more than one OWL account if you plan to use multiple devices simultaneously.

If you wish to log into the WiFi while you are at Lady Margaret Hall, you can use Eduroam or the Cloud. Any problems there are OWL codes available from the Porters in the Lodge. You can register with the Cloud once you are on site.

Your room: Residential participants have rooms booked at Lady Margaret Hall, Unfortunately, there is no parking available at the College (if you have special requirements then please contact the local organizer) however the Pear Tree and Water Eaton Park and rides are very convenient as the buses stop near the College: [Park and Ride sites – Oxford City Council](#). The College is a 30-minute walk from the railway station and a 25-minute walk from the bus and coach station at Gloucester Green. Taxis are available from outside the Oxford train station or Bus 14 runs from the rail station up Banbury Road which is good for Lady Margaret Hall.

All residential delegates have been booked ensuite single room accommodation at Lady Margaret Hall for 4 nights from Monday 9 December until Friday 13 December.

The Porters' Lodge is at the main entrance to the College on Norham Gardens OX2 6QA. It is manned 24 hours a day. Please press the large button to open the door. The Porter will give you a map and directions, the key to your room and a fob that gives you access to the buildings. On the outside of buildings there is a receiving pad which will recognise the fob when it is presented to it and that will unlock the door. Many of the doors open automatically, so please be patient as they react to fobs.

If you have any problems the number for the Porters' Lodge is 01865 274300. The Porters' Lodge is manned 24 hours a day, although the Night Porter may be out on site from time to time. If you arrive at night and the Porter is not in the Lodge you can call them on 01865 274300 and they will return to the Lodge.

All bedrooms are ensuite. Linen and bedding is provided and tea and coffee making facilities are in all the rooms. Breakfast will be served in the Deneke Dining Hall between 07:30 and 09:00

The College Grounds are beautiful, and while at Lady Margaret Hall you are welcome to enjoy the surroundings. Please take extra care and attention when walking in the College grounds – there are mature trees, uneven and slippery surfaces and a riverbank. There is also a service road which runs along one side of the site which is used intermittently by cars and large lorries, so please take all normal care when near to the road or crossing it.

Smoking at Lady Margaret Hall Smoking is only permitted on site in the designated smoking areas (see map – the thick red circles indicate the permitted areas).

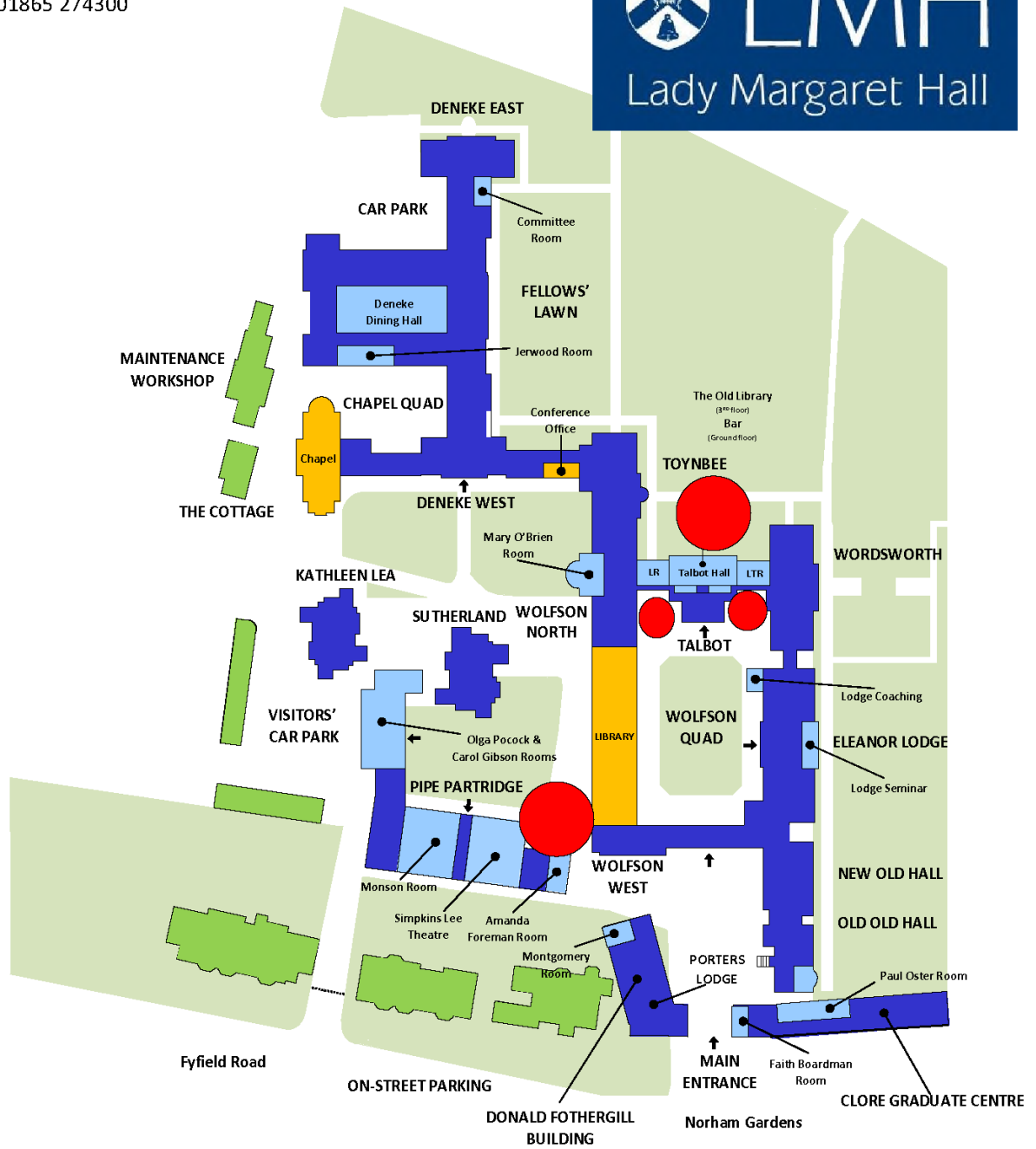
Meals: All meals, with the exception of the Academy Dinner and the Social Event will take place in the Deneke Dining Hall at Lady Margaret Hall. Breakfast will be served from 07:30 – 09:00, lunch from 12:45–14:00 and dinner from 18:00–19:00 on Monday and 17:30-18:30 on Wednesday. All food at Lady Margaret Hall is prepared in their kitchens by their Chefs and Catering team. Allergens are clearly identified. If you have any particular dietary requirements, please let the organiser of your event know in advance of your visit.

On Tuesday, the Social Event will start at the Pitt Rivers Museum at 6pm followed by pizzas, cakes and a bar back in the Department of Statistics. from 7.30 pm. The Academy Dinner will be held at Balliol College at 20:00 on Thursday.

Have a great week!

Lady Margaret Hall
 Norham Gardens
 Oxford
 OX2 6QA

Tel: 01865 274300



KEY:





- Classrooms
- Rooms of Interest
- College Buildings / Accommodation
- Support Buildings

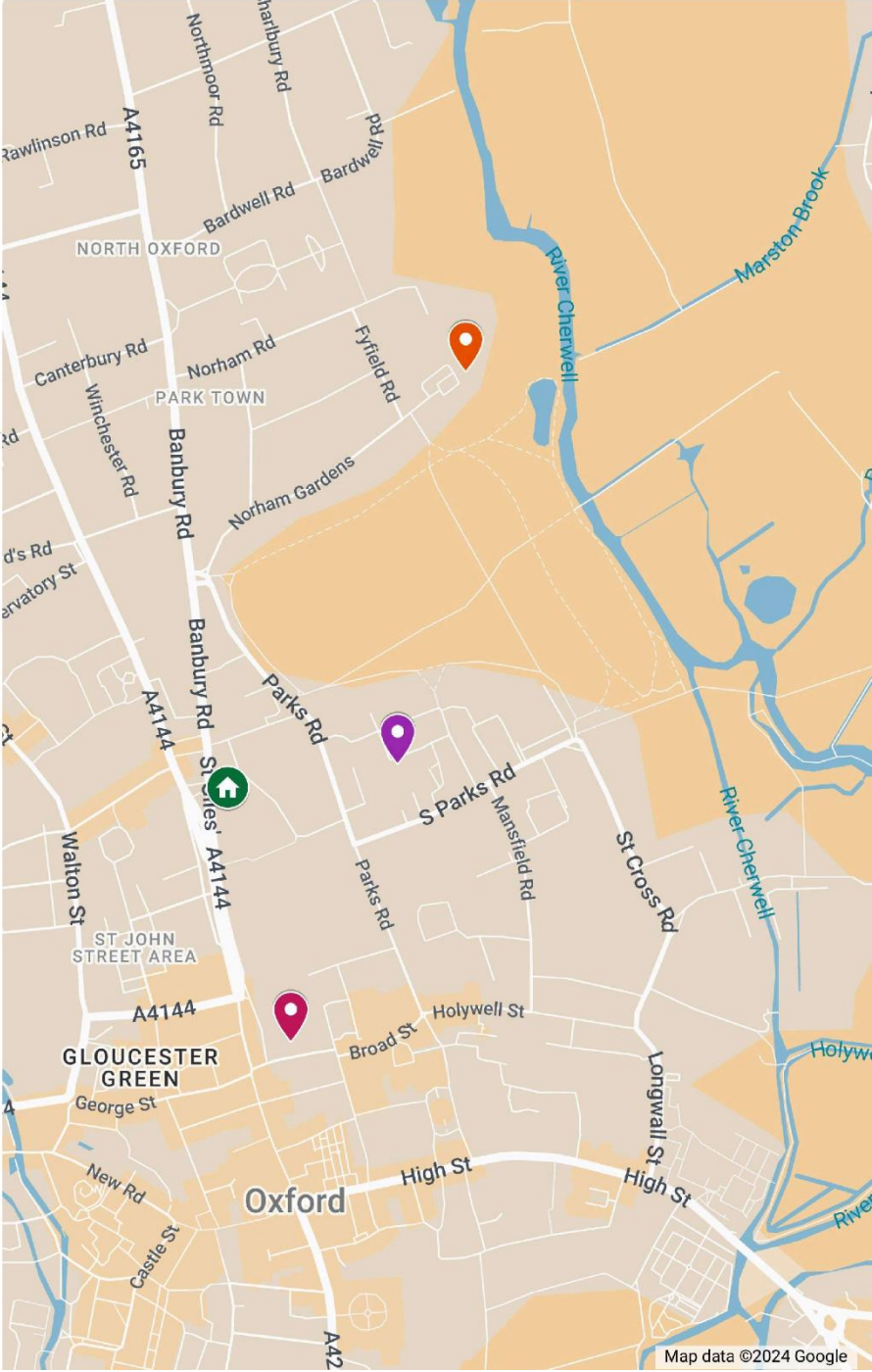
Red dots are Smoking areas





LR is Lyttleton Rm and LTR is Lavinia Talbot Rm

APTS Oxford December 2024

Key locations

-  Department of Statistics
-  Lady Margaret Hall
-  Pitt Rivers Museum
-  Balliol College



-  Department of Statistics, 24-29 St Giles, Oxford OX1 3LB
-  Lady Margaret Hall Lodge, Norham Gardens, Oxford OX2 6QA
-  The Pitt Rivers Museum, Oxford OX1 3PP (Entrance and Exit - South door on Robinson Close)
-  Balliol College, Broad Street, Oxford OX1 3BJ

APTS Timetable

	Monday 9 th December	Tuesday 10 th December	Wednesday 11 th December	Thursday 12 th December	Friday 13 th December
07:30 – 09:00		Breakfast			
09:15 – 10:45		Statistical Inference	Statistical Inference	Statistical Inference	Statistical Inference
10:45 – 11:15		Tea & Coffee Break			
11:15 – 12:45	Registration	Statistical Computing	Statistical Computing	Statistical Computing	Statistical Computing
12:45 – 14:00	Lunch				
14:15 – 15:45	Statistical Inference	Statistical Inference	Free afternoon	Statistical Inference	
15:45 – 16:15	Tea & Coffee Break			Tea & Coffee	
16:15 – 17:45	Statistical Computing	Statistical Computing (Practical)		Statistical Computing (Practical)	
17:45 – 18:00	Free Time	Social Event: Pitt Rivers Museum followed by pizzas, cake and a bar at the Department of Statistics 18.00 to 22:00	Dinner (17:30-18:30)	Free Time	
18:00 – 19:00	Dinner			Free Evening	Academy Dinner at Balliol College 20.00 (please arrive by 19:45)
Evening	Free Evening				

Local information

Location of lectures: All APTS lectures will take place in the Large Lecture Theatre (LG.01) at the Department of Statistics, 24–29 St Giles', Oxford OX1 3LB. The practical sessions will take place in the Large Lecture Theatre (LG.01), IT Teaching Suite (LG.02) and Small Lecture room (LG.03) at the Department of Statistics.

Tea and coffee breaks: Refreshments will be served in the ground floor social area at the Department of Statistics.



Figure 2: Pitt Rivers Museum (left) and Balliol College (right).

Evening events: Tuesday evening will start with a private introduction and self-guided tour of the Pitt Rivers Museum, Oxford OX1, followed by pizzas, cakes and a bar back at the Department of Statistics. There will be a walking bus to the Pitt Rivers Museum leaving the Department of Statistics at 6.00 pm. The Academy Dinner will take place at Balliol College at 8.00 pm on Thursday 12 December (see Figure 2). **Dress code:** Smart casual. Balliol College is approx. 10 minutes' walk from the Department.

Sports facilities: Oxford University Sport <https://www.sport.ox.ac.uk/> offer a day pass structure for non-members for the Pulse Gym (£9 for one session) and Swim (£10 per session). They also have a number of fitness classes (£10 per class) available for non-members. Please note, prebooking is required for swimming, gym and fitness classes. You will need to register first, using the link below:

<https://oxforduniversity.leisurecloud.net/JoinAtHome/landing.aspx?AppId=JHCL>.

The Sports centre is located on Iffley Road, OX4 1EQ approx. 35 minutes' walk from Lady Margaret Hall.

Things to do in Oxford: Oxford is a beautiful and historic city with many local attractions. Some suggestions on activities of interest are given below:

University of Oxford Colleges: Oxford University is the oldest University in the English-speaking world. Countless famous figures and great minds have studied here and you may wish to explore some of the colleges that they were a part of. There are 38 independent colleges, many of whom open their doors to visitors at least a few hours every day. Many are free to visit, but some charge a small fee. Further details can be found at the link below: <https://www.ox.ac.uk/visitors/visiting-oxford/visiting-the-colleges>.

Museums, Libraries and places of interest: Oxford has a wealth of museums such as the Ashmolean Museum and the Oxford University Museum of Natural History, places of interest such as the Sheldonian Theatre as well as many tranquil areas to get away from the hustle and bustle, such as Christ Church Meadow and University Parks. For further details please see the link below: <http://www.ox.ac.uk/visitors/visiting-oxford/visiting-museums-libraries-places>.

TV & Film Locations Oxford is a great favourite of the film industry and has been featured as the backdrop for many TV series and films such as Inspector Morse and Harry Potter. Further details can be found at: <https://www.experienceoxfordshire.org/things-to-do/films-in-oxford-oxfordshire/>

Other places of interest There are many neighbouring tourist attractions that are easily accessible from Oxford such as Blenheim Palace and Bicester Village. For further details please see: <https://www.experienceoxfordshire.org/oxfordshire-daycation/>

Emergency details

In Office Hours

Medical Assistance: Please speak to Reception at the Department of Statistics if you need any medical assistance.

Messages: The telephone number for colleagues or family to leave an urgent message for you during office hours is +44 (0)1865 272860 or +44 (0)1865 281536.

Fire Procedures: The fire alarm is tested weekly, usually on Thursday mornings around 9:00 am. There is no need to evacuate the building then. If the fire alarm is sounded at any other time, you must evacuate the building. If you discover a fire, set the fire alarm off using the nearest red fire call point. In the event of the fire alarm sounding, evacuate the building safely and quickly. Do not use the lift. The assembly point is outside the Department of Physics on Keble Road. Full details of safety procedures will be provided at registration.

Out of Office Hours

Medical Assistance: All Lady Margaret Hall Porters are first aid trained. If you require first aid assistance or medical attention, please contact the Porters and inform them of your situation and the appropriate action will be taken. The Porters should be contacted in the event of any emergency and they will call for the emergency services. The number for the Porters is 01865 274300.

Messages: The Lodge, Lady Margret Hall, is open 24 hours and the Duty Porter will be glad to assist with all your queries. The Lodge can be contacted on +44 (0)1865 274300.

Fire Procedures: Please help keep our buildings safe from fire by:

- Keeping all fire exits clear
- Keeping all marked fire doors shut
- Only plugging in portable electrical items with in-date PAT certificate or that you have checked for wear and tear, particularly electrical cables
- In every room there are instructions about emergency exits and assembly points. Please make yourself familiar the these

In the event of a continuous alarm sounding in your building:

- Do not stop to collect personal belongings
- Do not use the lifts
- Exit the building by your nearest emergency exit
- Assemble in the designated evacuation point
- Await further instruction from the Porters
- Do not re-enter the building until the Porters have confirmed it is safe to do so

If you discover a fire, immediately raise the alarm using the break glass call points. Evacuate the area and report to the Porters' Lodge. Do not attempt to fight the fire unless you have been correctly trained, or the fire is very small and you can do so without endangering yourself or others.

Module details

Statistical Computing

Module leader: [Matteo Fasiolo](#) and [Anthony Lee](#)

Please see the full [Module Specifications](#) for background information relating to all of the APTS modules, including how to interpret the information below.

Aim: To introduce, in a practical way, the fundamentals of numerical computation for statistics, in order to help students to write stable, fast and numerically accurate statistical programs.

Learning outcomes: After taking this module students will

- understand the importance of stability, efficiency and accuracy in numerical computations, and how these may be promoted in practical statistical computation;
- understand the main difficulties and other issues that arise in the topics given below;
- be aware of standard computational libraries and other resources.

Prerequisites: In preparation for this obtain an elementary knowledge of the use of R. (Knowledge also of a lower level language such as C, Pascal or Fortran would be an advantage but will not be presumed.) Preparation for this module should also (re-)establish familiarity with Taylor's theorem and with basic matrix algebra — e.g., notion of an inverse and eigenvalues, manipulation of matrix expressions, the numerical unsuitability of Cramer's rule for computation of an inverse.

Further reading:

- Lange, K. (2010). Numerical Analysis for Statisticians, second edition, Springer.

Topics:

- Finite-precision arithmetic; related types of error and stability (probably mostly covered, in context, as part of other topics).
- Numerical linear algebra (with statistical applications): basic computational efficiency, Choleski, QR, stability (e.g. Normal/Choleski vs QR for LS), eigen and singular value decompositions. Standard libraries.
- Optimization: Newton-type methods; other deterministic methods; stochastic methods; using methods effectively in practice; what to use when.
- Differentiation and integration by computer: finite differencing (interval choice, cancellation and truncation errors); automatic differentiation; quadrature methods; stochastic integration.
- Basics of stochastic simulation.
- Other types of problem (e.g. sorting and matching); the pervasiveness of efficiency and stability issues; where to find out more.

Assessment: A short project bringing together several of the topics covered. For example writing a routine to estimate a linear mixed model by (RE)ML

Statistical Inference

Module leader: [Michael Goldstein](#)

Please see the full [Module Specifications](#) for background information relating to all of the APTS modules, including how to interpret the information below.

Aims: To explore a number of statistical principles, such as the likelihood principle and sufficiency principle, and their logical implications for statistical inference. To consider the nature of statistical parameters, the different viewpoints of Bayesian and Frequentist approaches and their relationship with the given statistical principles. To introduce the idea of inference as a statistical decision problem. To understand the meaning and value of ubiquitous constructs such as p-values, confidence sets, and hypothesis tests.

Learning outcomes: An appreciation for the complexity of statistical inference, recognition of its inherent subjectivity and the role of expert judgement, the ability to critique familiar inference methods, knowledge of the key choices that must be made, and scepticism about apparently simple answers to difficult questions.

Preliminaries: Students should have done at least one course in probability and one in statistics. Students should be familiar with: the idea of a statistical model, statistical parameters, the likelihood function, estimators, the maximum likelihood estimator, confidence intervals and hypothesis tests, p-values, Bayesian inference, prior and posterior distributions.

Further information on all of these topics can be found in standard undergraduate statistics textbooks, for example

- J.A. Rice, 1999, *Mathematical Statistics and Data Analysis*, 2nd edn, Duxbury Press (more recent edition available); or
- Morris H, DeGroot, and Mark J Schervish, 2002, *Probability & Statistics*, Addison Wesley, 3rd edn. Prof. Schervish maintains a list of errata at <http://www.stat.cmu.edu/~mark/degroot/index.html>.

More advanced treatments can be found in

- G.A. Young and R.L. Smith, 2005, *Essential of Statistical Inference*, Cambridge University Press.
- A.C. Davison, 2003, *Statistical Models*, Cambridge University Press. This book also contains a wealth of applications. Prof. Davison maintains a list of errata at <http://statwww.epfl.ch/davison/SM/>.

Topics:

1. What is statistics? Statistical models, prediction and inference, Frequentist and Bayesian approaches.
2. Principles of inference: the Likelihood Principle, Birnbaum's Theorem, the Stopping Rule Principle, implications for different approaches.
3. Decision theory: Bayes Rules, admissibility, and the Complete Class Theorems. Implications for point and set estimation, and for hypothesis testing.

4. Likelihood based estimators and their large sample properties. Confidence sets, hypothesis testing, and P-values. Relationships between Bayesian and frequentist intervals.
5. Limitations of models of statistical inference. Exchangeability representations. Lessons from Uncertainty Quantification.

Assessment: General questions on the implementation of different approaches in particular types of inference, possibly involving additional reading.

