# apts.ac.uk

**Academy for PhD Training in Statistics**

WEEK 1: UNIVERSITY OF OXFORD

15-18 DECEMBER 2026

# Welcome to Oxford!

We are looking forward to welcoming you to Oxford for the first APTS Week of 2026-27. A map showing key locations for the week can be found on page 9 of this booklet.

**Workshop registration:** Registration for the APTS week will take place between 11:15–12:45 on Tuesday 15 December 2026 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 Statistic (left) and St Anne's College (right)**

**Accommodation:** Residential participants have rooms booked at St Anne's College, Woodstock Road, Oxford OX2 6HS (see map on page 9). Check in is from 15:00 on Tuesday 15th December although you are welcome to drop off your luggage at the storage facility near the Porters' Lodge earlier in the day. The Porters' Lodge faces on to Woodstock Road and is manned 24 hours a day.

Check out is by 10:00 on Friday 18th December. Any missing key or fob will incur a £30 charge per item. You will be able to store your luggage at the Department of Statistics on Friday morning.

Further information about St Anne's College can be found on pages 5-8.

**Getting to St Anne's:** St Anne's has two designated parking spaces on site for Blue Badge holders. Anyone needing to use a designated space should contact the Porters Lodge in order to request a space. The parking spaces are accessed from Woodstock Road.

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 20-minute walk from the railway station and a 12-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 (Bevington Road stop) which is then a 1-minute walk to St Anne's College.

**Lunches and refreshments:** All lunches (except Friday, see below) will be taken in the Dining Hall at St Anne's College from 12.30 pm – 2.00 pm. St. Anne's College are aware of the need to look after the environment. They are mindful of sustainability and work towards an ethos based around seasonal food and sustainably sourced ingredients. Their chefs pride themselves in creating delicious & imaginative seasonal menus with emphasis on fresh ingredients and sustainability, sourced locally whenever possible.

All coffee breaks will be taken in the ground floor social area at the Department of Statistics. See timetable on page 10 for further details.

**IT:** You are encouraged, if possible, to bring a laptop with R installed for taking part in the Statistical Computing module, where R and RStudio Desktop (the open-source, free version) are recommended for the practical lab-session.

There will also be a computer lab with 50 desktop computers available for the practical sessions. However, this is in a separate room from the lecture theatre in which most of the students and tutors will be based. In previous years students have preferred to work on practicals in the lecture theatre.

**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.

**Meals:** All meals, with the exception of the Academy Dinner, the Social Event and the optional Friday lunch, will take place in the Dining Hall at St Anne's College. Breakfast will be served from 07:30 – 09:00, lunch from 12:45–14:00 and dinner from 18:30–19:30 on Wednesday. All food at St Anne's College 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 15th December, the Welcome & Social Event will start at the Pitt Rivers Museum followed by pizzas, cakes and drinks back in the Department of Statistics from 19:30. A walking train will leave the department at 6pm for the Pitt Rivers Museum. The Academy Dinner will be held at Harris Manchester College at 19:30 on Thursday 17th December. See Timetable and Local Information sections below for further detail.

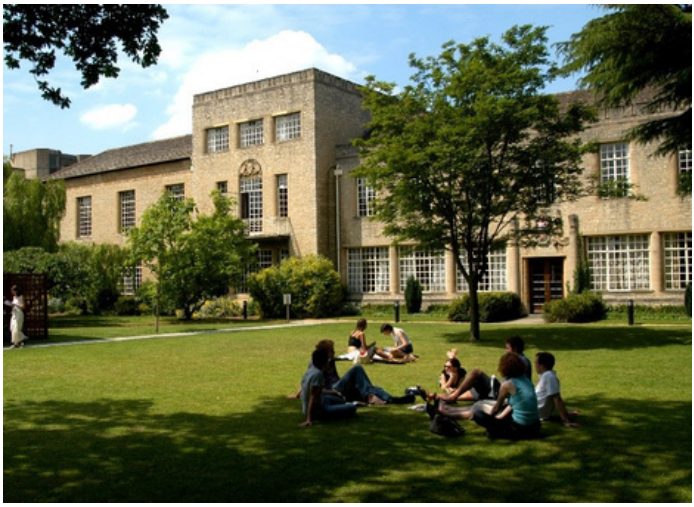
On Friday 18th December, after the last lecture, there is an optional lunch in the Department of Statistics from 12:45-2pm. There will be an opportunity to sign up for this lunch at registration.

*Have a great week!*

# WELCOME TO ST ANNE'S COLLEGE

Set out below are a few things you may want to know whilst staying with us.
If you have any questions, please don't hesitate to contact the lodge, our porters will be happy to assist you.

We hope you have a pleasant and enjoyable stay!



**Breakfast Times (Residents only)**

Breakfast (Monday – Friday) 07:30 – 09:00

Breakfast (Saturday - Sunday) 08:00 – 09:30

**Housekeeping**

Please remember to place the sign on the outside of your door by 10am if you wish to have your room serviced or not be disturbed.

**Please note – rooms are serviced Monday – Friday**

If you require fresh towels, toiletries or other amenities, please head to the lodge and a porter will be happy to assist.

Please report any faults with the room to the lodge porters as soon as possible.

**Check In/Out Time**

Please note check in time is from **15:00** at the earliest

Please note check out time and key return is by **10:00** at the latest

Any missing key or fob will incur a £30 charge per item

No Smoking

There are designated smoking points around the College and there is strictly no smoking in any of the buildings.

**Free Wi-Fi**

1. Check your WIFI is on
2. Select THE CLOUD from the available Network list
3. Open the browser and follow the on-screen Instructions to register.
4. Once you're registered you will seamlessly connect to the cloud WIFI without needing to re-enter your username and password.

**Conduct and Behaviour**

St Annes College does not tolerate any form of harassment, in particular sexual harassment or any form of discrimination against staff.

**Security**

Always lock your door behind you and close all windows.
Please keep your key and fob with you.
Please report any suspicious activity to the Porters' Lodge.

**Emergency Contacts**

Please contact the Lodge
06:30 – 18:00 – 01865 274800
18:00 - 06:30 – 07973 904797

**Fire Alarms**

Fire alarm tests will take place every Monday at 9:30am and will sound for a short period. If the alarm sounds at any other time and is continuous, please follow the full fire instructions that are located in every bedroom.
Please take the time to read these and familiarise yourself with the location of your nearest fire exit, extinguishers, fire assembly points, and alarm call point.

**Sustainability**

At St. Anne's College we are aware of the need to look after the environment. We are mindful of sustainability and work towards an ethos based around seasonal food and sustainably sourced ingredients.
Our chefs pride themselves in creating delicious & imaginative seasonal menus with emphasis on fresh ingredients and sustainability, sourced locally whenever possible.






St Anne's College
University of Oxford

**KEY**

**A** - Seminar Rooms 1, 2, 3, 4 & 5
**B** - Estate's Office
**C** - Seminar Room 6
**D** - Mary Ogilvie Lecture Theatre
**E** - Lower & Upper Common Rooms
**F** - Seminar Rooms 7, 8 & 9, & Tsuzuki Lecture Theatre
**G** - Seminar Rooms 10 & 11
**H** - STACS
**J** - College Bar
**K** - Conference & Accommodation Office
- WC
- Fire Assembly Point
- Recycling Point
- Smoking Area

**Local Pubs**

Royal Oak 0.1 Mile 42-44 Woodstock Rd, Oxford OX2 6HT

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Dodo Pub 0.3 Mile 67 Cranham St, Oxford OX2 6DE

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Jude the Obscure 0.2 Mile 54 Walton Street, OX2 6AE

**Taxi Companies**

001 Taxis - 01865 240000
Royal Cars - 01865 777333
Uber Available

**Places to Visit**

Oxford Botanic Gardens, Rose Lane
(10:00 - 17:00)

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Oxford Castle & Prison
(10:00 – 17:00)

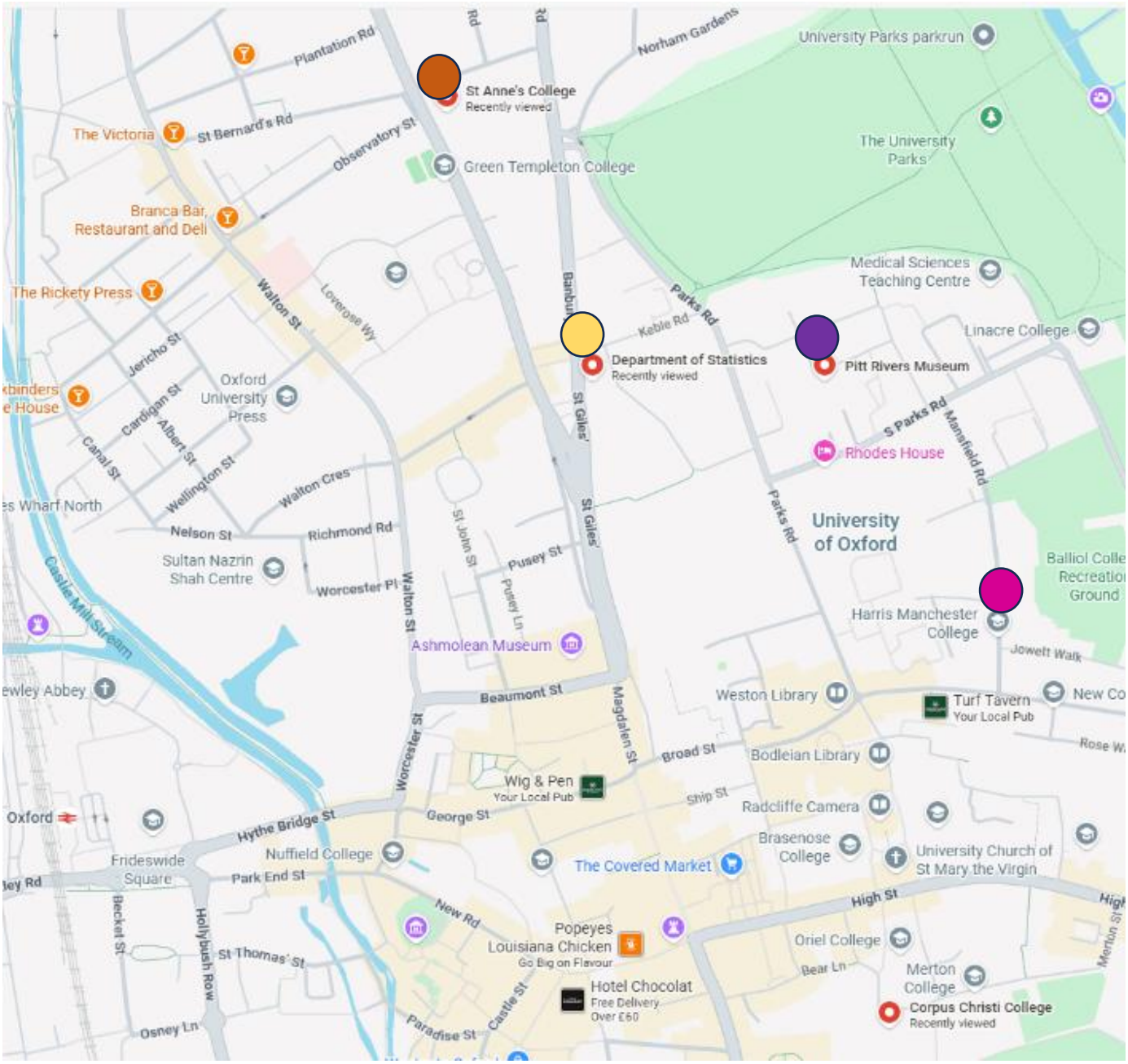
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Ashmolean Museum, Beaumont Street
(10:00 - 17:00)

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Natural History Museum, Parks Road
(10:00 - 17:00)

# APTS Oxford December 2026




Department of Statistics, 24-29 St Giles, Oxford OX1 3LB

St Anne's College, Woodstock Road, Oxford OX2 6HS

The Pitt Rivers Museum, Oxford OX1 3PP (Entrance and Exit - South door on Robinson Close

Harris Manchester College, Mansfield Road, Oxford OX1 3TD

# APTS Timetable

| | Tuesday 15th December | Wednesday 16th December | Thursday 17th December | Friday 18th December |
|---|---|---|---|---|
| **07:30 – 09:00** | | Breakfast | | |
| **09:15 – 10:45** | | **Statistical Inference** | **Statistical Inference** | **Statistical Inference** |
| **10:45 – 11:15** | | Tea & Coffee Break | | |
| **11:15 – 12:45** | Registration | **Statistical Computing** | **Statistical Computing** | **Statistical Computing** |
| **12:45 – 14:00** | Lunch at St Anne's College | | | Optional lunch in Stats |
| **14:15 – 15:45** | **Statistical Inference** | **Statistical Inference** | **Statistical Inference** | |
| **15:45 – 16:15** | Tea & Coffee Break | | | |
| **16:15 – 17:45** | **Statistical Computing** | **Statistical Computing (Practical)** | **Statistical Computing Lecture/Practical** | |
| **17:45 – 19:30** | **Welcome & Social Event:** Pitt Rivers Museum followed by pizzas, cake and drinks at the Department of Statistics | Dinner, St Anne's College **(18:30-19:30)** | Free time | |
| **19:30 – 21:00** | | Free Evening | **Academy Dinner** at Arlosh Hall, Harris Manchester College **19:30 (please arrive by 19:15)** | |

# 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) 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 Harris Manchester 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 drinks 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 in the Arlosh Hall, Harris Manchester College at 7.30pm on Thursday 18th December (see Figure 2). **Dress code**: Smart casual. Harris Manchester College is approx. 14 minutes' walk from the Department.

**Sports facilities: Sports facilities:** Oxford University Sport **https://www.sport.ox.ac.uk/** offer a day pass structure for non-members for the Pulse Gym (£10 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 can register and book using the link below: https://onlineshop.sport.ox.ac.uk/

The Sports Centre is located on Iffley Road, OX4 1EQ approx. 35 minutes' walk from St Anne's College.

**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 in the Department of Statistics 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:** If you require first aid assistance or medical attention, please contact the Porters at St Anne's College 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 274800 (06:30 – 18:00) or 07973 904797 (18:00 – 06:30).

**Messages:** The Lodge is open 24 hours and the Duty Porter will be glad to assist with all your queries. The Lodge can be contacted on 01865 274800 (06:30 – 18:00) or 07973 904797 (18:00 – 06:30).

**Fire Alarms**

Fire alarm tests in St Anne's college will take place every Monday at 9:30am and will sound for a short period. If the alarm sounds at any other time and is continuous, please follow the full fire instructions that are located in every bedroom. Please take the time to read these and familiarise yourself with the location of your nearest fire exit, extinguishers, fire assembly points, and alarm call point.

# 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 module, students should 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 set of exercises set by the module leader. 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.

## Notes