Week 4: University of Oxford
1st – 5th September 2014
Welcome to Oxford!

Workshop registration: Registration for the APTS week will take place between 11.15 a.m. and 12.45 p.m. on Monday 1st September 2014 in the Reception Area, Foyer A Ruth Deech Building, St Anne’s College. A map of the College can be found on page 7 of this booklet. All delegates should read the ‘important points’ on page 5 which St Anne’s College have asked us to draw your attention to.

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.

Luggage: Check-in for residential delegates is from 11.30 a.m. at the Lodge on Monday 1st September. Check-out is by 10 a.m. on Friday 5th September however you can store your luggage at the Lodge until you leave after lunch.

IT: You are encouraged, if possible, to bring a laptop with R installed for taking part in the Statistical Computing practical sessions. See note on page 9 for further details. There will also be a computer lab of desktop computers available for the practical sessions.

All delegates will be issued with free wifi logins which can be collected upon arrival either from the Lodge for residential delegates or from the Registration desk for day delegates. St Anne's have OWL (a central wireless service for both University Members and Visitors) and Eduroam - the login codes will be for an OWL visitor. If Eduroam is preferred, delegates will need to set this up with their own institution beforehand.

Have a great week!
Accommodation information

St Anne’s College,
56 Woodstock Road, Oxford OX2 6HS

TRAVEL/LOCATION

Your accommodation is based at the above address.

Unfortunately there is no parking available at the College (only under special circumstances) however the Pear Tree and Water Eaton Park and rides are very convenient as the buses stop near the College: [http://www.oxford.gov.uk/PageRender/decTS/Park_and_Ride_occw.htm](http://www.oxford.gov.uk/PageRender/decTS/Park_and_Ride_occw.htm).

The College is about a 30 minute walk from the railway station (taxis are available outside Oxford train station) and 15 - 20 minutes' walk from the bus and coach station.

ACCOMMODATION

All residential delegates have been booked accommodation at St Anne’s College for 4 nights from Monday 1st September until Thursday 4th September. Check-in is from 11.30 a.m. on Monday 1st September at the Lodge and check-out is by 10.00 a.m. on Friday 5th September.

Facilities/Services

- All rooms have washbasins and overlook the main quad. They are within easy reach of the Hall and meeting rooms.
- Hospitality trays, tea and coffee making facilities, towels and toiletries are provided in each room.
- St Anne's ask that everyone is quiet between midnight and 08.00 am.
- Breakfast is in the main Dining Hall between 0800 and 0900 am.
- St Anne’s recommend that you lock your bedroom door at all times.
- Please be aware that fire procedure details and a site map showing fire assembly points are on the back on each bedroom door.
- Please do not divulge entry door codes to anyone you do not know.
- Please return your keys upon departure.
IMPORTANT POINTS:

Please take a few minutes to read through the important points that St Anne’s have asked that we draw your attention to:

• We have a “no smoking indoors” policy and we ask that people only smoke at the 14 designated points shown on the College map on page 7.

• We have a no cycling policy within College for Health and Safety reasons.

• We ask that all cycles are parked in the area adjacent to the Banbury Road.

• We ask that you go to the Fire Assembly Points, shown on the campus map on page 7, in the event of a fire alarm.

• We ask that all persons follow the instructions of Lodge Porters in the event of a fire or emergency.

• We ask you to contact the Lodge if you have any emergency or see something suspicious (the Lodge is 01865-274800).

• St Anne’s is an historic campus that has natural hazards. There are control measures in place but all risks cannot be eliminated. Visitors are respectfully reminded of their responsibility to take care of themselves throughout their visit.
Medical and emergency information

**Medical Assistance:** Please contact the Lodge which is open 24 hours a day.

**Messages:** The telephone number for colleagues or family to leave an urgent message for you during office hours is +44 01865 284950 or +44 1865 281536. For emergency messages outside of office hours, please call the Lodge on +44 1865 274800.

**Fire Procedures:** Please see the fire assembly points on the campus map (page 6), there are also fire procedures in each bedroom and a warden in a yellow jacket will be present immediately in the event of a fire alarm going off.
## Timetable

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<thead>
<tr>
<th>Time</th>
<th>Monday 1st September</th>
<th>Tuesday 2nd September</th>
<th>Wednesday 3rd September</th>
<th>Thursday 4th September</th>
<th>Friday 5th September</th>
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<tbody>
<tr>
<td>09.15 – 10.45</td>
<td>Spatial and Longitudinal Data Analysis</td>
<td>Spatial and Longitudinal Data Analysis</td>
<td>Nonparametric Smoothing</td>
<td>Nonparametric Smoothing</td>
<td>End</td>
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<tr>
<td>10.45 – 11.15</td>
<td>Tea and coffee break</td>
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<tr>
<td>11.15 – 12.45</td>
<td>Registration – Foyer A, RDB Building</td>
<td>Spatial and Longitudinal Data Analysis</td>
<td>Spatial and Longitudinal Data Analysis</td>
<td>Nonparametric Smoothing</td>
<td>Nonparametric Smoothing</td>
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<td>13.00 – 14.00</td>
<td>Lunch Break</td>
<td>Spatial and Longitudinal Data Analysis</td>
<td>Spatial and Longitudinal Data Analysis</td>
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<tr>
<td>14.00 – 15.30</td>
<td>Spatial and Longitudinal Data Analysis</td>
<td>Spatial and Longitudinal Data Analysis</td>
<td>Nonparametric Smoothing</td>
<td>Nonparametric Smoothing</td>
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<tr>
<td>15.30 – 16.00</td>
<td>Tea and coffee break</td>
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<tr>
<td>16.00 – 17.30</td>
<td>Spatial and Longitudinal Data Analysis</td>
<td>Spatial and Longitudinal Data Analysis</td>
<td>Nonparametric Smoothing</td>
<td>Nonparametric Smoothing (Computer Lab)</td>
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<tr>
<td>17.30 – 18.00</td>
<td>Free time</td>
<td>Free time</td>
<td>Free time</td>
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<td>18.00 – 18.30</td>
<td>RSS Wine Reception RDB</td>
<td>Arrive at Cherwell Boathouse by 18.15 for punting at 18.30 hours.</td>
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<td>Dinner-Dining Hall</td>
<td>Pre-dinner Drinks Reception RDB</td>
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<td>18.30 – 19.00</td>
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<td>Dinner-Dining Hall</td>
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<td>Academy Dinner RDB</td>
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<td>19.00 – 20.45</td>
<td>Dinner – Dining Hall</td>
<td>BBQ at 20.00 hours</td>
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<tr>
<td>Evening</td>
<td>Free time</td>
<td></td>
<td></td>
<td>Free time</td>
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- All APTS lectures will take place in the Tsuzuki Lecture Theatre in the Ruth Deech Building (RDB); Computer Lab sessions will take place in the Thames Suite, IT Services, 13 Banbury Road (see map on page 9)
- Mid-morning and afternoon refreshments will be in Foyer A of the Ruth Deech Building
- Lunch will be self-service style in Foyer B of the Ruth Deech Building
- RSS Wine Reception: The Royal Statistical Society are kindly sponsoring this event again.
The computer lab sessions will be held in the Thames Suite, IT Services, 13 Banbury Road, Oxford [http://bit.ly/1oGhcVR](http://bit.ly/1oGhcVR).

Information about R and bringing own laptops: You may wish to bring a laptop with R installed for taking part in the Statistical Computing practical sessions. Students who do this will find it convenient to have one of the correct versions of R installed as well as any R modules needed for the practicals. Please see below for a list of these requirements:

rpanel, tkrplot, rgl, misc3d, akima, gam, sp, geoR, RandomFields, MASS, denstrip, lattice, sm, maps
APTS module: Spatial and Longitudinal Data Analysis

**Module leader:** P J Diggle

**Aims:** This module will introduce students to the statistical concepts and tools involved in modelling data which are correlated in time and/or space. The content will include models which are well established in statistical practice, although not usually well represented in the undergraduate curriculum, as well as examples of models which are central to current research in the area.

**Learning outcomes:** By the end of the module, students should have achieved:

- a clear understanding of the meaning of temporal and spatial correlation;
- a good working knowledge of standard models to describe both the systematic and the random parts of an appropriate model;
- the ability to implement and interpret these models in standard applications;
- an understanding of some of the key concepts which lie at the heart of current research in this area;
- appreciation of at least one substantial case study.

**Prerequisites:** Preparation for this module should establish familiarity with:

- standard models and tools for time series data, at the level of a typical undergraduate course on time series;
- standard models and tools for spatial data at its simplest level;
- inferential methods, including classical and Bayesian likelihood-based methods, to at least the level of the earlier APTS modules 'Statistical Inference' and 'Statistical Modelling'.

This module’s preliminary web-lectures will cover the first two of the above prerequisites.

**Topics:**

- Introduction: motivating examples; the fundamental problem — analysing dependent data.
- Longitudinal data: linear Gaussian models; conditional and marginal models; why longitudinal and time series data are not the same thing.
- Continuous spatial variation: stationary Gaussian processes; variogram estimation — what not to do and how to do it; likelihood-based estimation; spatial prediction.
- Discrete spatial variation: Markov random field models.
- Spatial point patterns: exploratory analysis; Cox processes and the link to continuous spatial variation; pairwise interaction processes and the link to discrete spatial variation.
- Spatio-temporal modelling: spatial time series; spatio-temporal point processes.
- Conclusion: review of available software (as preparation for mini-project); connections — spatial and longitudinal data analysis as two sides of the same coin.

**Assessment:** One of

- A critique, in essay form, of a specified research paper, including both modelling and application aspects;
• A mini-project involving the analysis of a data-set, selected by the student from several on offer (to allow students to focus on topics within the course which they find particularly interesting).

APTS module: Nonparametric Smoothing

Module leader: A W Bowman and L Evers

Aims: The term ‘nonparametric smoothing’ refers to a wide range of methods which allow data to be modelled flexibly. The course will start with the simplest case of density estimation and progress through standard forms of nonparametric regression to state-of-the-art modelling tools which can be applied in a wide variety of settings. The course will cover the main ideas from a conceptual perspective as well as investigating aspects of the underlying theory and computation. There will also be some exploration of practical use of the methods in real applications.

Learning outcomes: By the end of the module, students will: understand the techniques of kernel density estimation and nonparametric regression, with data from one or more dimensions; appreciate the issues of bias and variance associated with model fitting and selection; be aware of the range of mechanisms which can be used to smooth data; understand how these techniques can be incorporated into wider modelling tools; be able to use these methods in a wide range of applications.

Prerequisites: Linear models, including a Bayesian approach (Modelling); generalised linear models (Modelling); R programming (preliminary APTS material); Taylor series expansions and basic concepts of asymptotic properties (Asymptotics); matrix computations (Statistical Computing).

Topics:
• kernel approaches to density estimation and regression;
• spline and basis approaches;
• computational issues;
• an insight into asymptotic properties;
• nonparametric regression;
• generalised additive models;
• alternative approaches, including Gaussian processes;
• case studies.

Assessment: A set of exercises assigned by the module leader, including a data-analysis exercise involving practical use of some of the methods covered.
Evening events

**Monday 1st September:** The Royal Statistical Society is once again kindly sponsoring a wine reception for APTS participants on Monday evening. This will take place at 6.00 p.m. in Foyer A of the Ruth Deech Building. There will be a short talk given by a representative from the RSS.

**Tuesday 2nd September:** An evening of punting followed by a BBQ has been arranged at The Cherwell Boathouse on Tuesday with two special guests from industry joining us, Richard Hill from ATASS and Dr Jeremy Bradley from GCHQ. There will be opportunity to speak with them throughout the evening.

Please aim to arrive at the Boathouse for approx. 6.15 p.m. (there will be a ‘walking bus’ leaving St Anne’s at 5.55 p.m.) for punting from 6.30 p.m. – 7.30 p.m. This will be followed by a glass of pimms then the BBQ will start at 8.00 p.m. Drinks for the rest of the evening can be purchased from the bar. There will be opportunity to play your own music during the BBQ. If you would be interested in doing this please bring your phone with AUX output to play via their system – just a regular headphone jack.
**Thursday 4th September:** There will be a Pre-dinner drinks reception at 6.30 p.m. held in Foyer A of the Ruth Deech Building followed by The Academy dinner at 7.00 p.m. in Foyer B of the Ruth Deech Building at 7.00 p.m. This is to celebrate the work of the APTS and to round off the week. It is also an opportunity to thank the lecturers and support staff. Dress code: Smart casual.