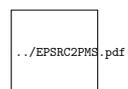




## WEEK 2: UNIVERSITY OF SOUTHAMPTON

23rd - 27th March 2015





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# Welcome to Southampton!

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**The City of Southampton:** The city has numerous parks and open spaces, including Southampton Common, situated near our Highfield Campus. The waterfront location also provides countless opportunities for sport and leisure with a wide range of water sports to appeal to all abilities.

Southampton is home to one of the UK's top 10 shopping centres, West Quay, and the city centre and waterfront marina both offer a range of independent shops, as well as restaurants, cafés, bars, pubs and clubs. With cinemas, theatres, galleries and museums, the city offers a rich assortment of cultural attractions.

**Surroundings:** Winchester, once the capital of England, has a rich cultural heritage and lively city atmosphere with galleries, museums, theatres, cinema and arts centre, as well as a wide variety of shops, pubs and restaurants. Furthermore, the New Forest National Park is the largest unenclosed area in southern England, where ponies, deer and cattle graze freely, in an environment that remains unchanged by the modern world. It stretches for 145 square miles (375km<sup>2</sup>), with open heaths and beautiful forest landscapes.

**Workshop registration:** Registration for the APTS week will be at the APTS registration desk, situated in the level 1 foyer of the Murray Building (building 58 on the Highfield Campus map), between 11.15 and 14.15 on Monday March 23rd. You will receive your welcome pack and badge from the registration desk. Please **wear your badge at all times**. This will help with security and also help you identify fellow participants.

**Accommodation check-in:** Check-in for accommodation will take place at Highfield Hall reception and can be done after the lectures have finished for the day. Secure luggage storage will be available for the afternoon of Monday March 23rd in the Murray Building (Building 58).

**Car parking:** Workshop participants staying in the Halls of Residence are able to use the Halls of Residence car park but spaces are limited. Car parking in the Halls of Residence is free of charge for residents during the APTS week. Car parking is by permit only (could you please let us know via email by 6th March if you require a permit).

**Messages:** The telephone number for colleagues or family to leave an urgent message for you during office hours is +442380 594548. For emergency messages outside these times, please call the main University Switchboard on +442380 595000.

**Other campus facilities:** Facilities at the Highfield Campus include a University shop, Post Office and bookshop. There are Lloyds TSB, HSBC, Santander and Barclays Banks on campus with cash dispensers.

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## Accommodation information

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**Your room:** Workshop participants requiring accommodation have been booked at rooms in Highfield Hall. These will be available from 3.00pm on Monday 23rd March. Secure luggage storage will be available close to registration in the Murray Building (Building 58) for the afternoon of 23rd March and again on the morning of Friday 27th March.

**Reception/Keys:** You should check in and collect your keys from the Highfield Hall reception on Monday 23rd March. This can be done from Monday 5pm (after the lectures have finished for the day). Please vacate your room by 9.00am on the day of departure and return your keys back to the Highfield Hall reception desk.

**Internet access:** All the rooms on campus are networked for free internet access, although you will need to provide your own ethernet cable. Wireless internet access is available in the Murray building using eduroam. For those without eduroam access and/or a laptop, a limited number of Southampton login IDs will be available enabling access to University of Southampton computing facilities, including the wireless. If you require a Southampton ID, please let us know no later than **Thursday March 5th**

### **Meals:**

*Breakfast:* Highfield Dining Room (Dining Hall at Highfield Hall on the map below) will provide a full English or continental breakfast from 08.00 am – 08.30 am, each morning of your stay.

*Lunch:* There will be a finger buffet on the Monday in the foyer of the Murray Building. From Tuesday to Thursday lunch will be served in the University Social Centre (building 38 on the Highfield Campus map).

*Evening:* Evening meals will be provided in the Highfield Dining Room (Monday to Wednesday) serving a three course cafeteria style dinner. The Academy Dinner on Thursday will be held in the University Social Centre with a bar which serves a selection of beers, wines, spirits and soft drinks. Dinner will be ready to be served at 7.30pm. The bar will be open from 7.00pm.

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## Emergency information

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### **First Aid and accident reporting:**

In the event of an accident that needs medical attention the nearest first aider should be contacted. The names and locations of trained first aiders are displayed on green and white signs throughout each building.

In the event of a serious accident, the ambulance service should be contacted immediately by dialling **91-999** before calling a first-aider and notifying the Central Control Room (CCR) on extension **3311**. The CCR non-emergency contact number is **22811**.

### **Fire safety and emergency procedures:**

*Action in the event of fire in other building:* If you notice a fire you should immediately raise the alarm by breaking the glass of the nearest manual fire alarm call point. This can be done using your elbow or shoe. The alarm is a continuous bell.

*Calling the Fire Service:* The person raising the alarm should ensure that the Fire Service is summoned by either reporting to someone in authority, or by dialling **91-999** from a telephone **remote from** where the alarms are sounding. Following this, the University Control Centre Room (CCR) should be alerted by dialling **3311**.

*On hearing the continuous ringing of fire bells:*

Stop what you are doing.

Leave by the nearest Fire Exit.

Walk calmly, do not run.

Do not stop to collect personal belongings.

Make your way to the nearest evacuation point, standing well clear of the building.

Do not re-enter the building until told to do so by the Fire Service or University Security staff.

# Highfield Campus map



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University of Southampton

### Conference and Hospitality Facilities

- 2 Management School
- 4 Law School
- 6 Nuffield Theatre
- 7 Lanchester Building
- 13 Tizard Building

- 27 Chemistry
- 29 Chemistry
- 30 Chemistry
- 32 EEE Building
- 38 Staff Social Centre
- 40 Conference Office
- 42 Garden Court

- 42 Piazza
- Students' Union
- 44 Shackleton Building
- 45 Centre for Innovation and Leadership in Health Sciences
- 46 Physics & Astronomy
- 52 Turner Sims
- 54 Mathematics

- 52 Turner Sims
- 54 Mathematics
- 57 Students' Union Shop
- 58 Murray Building
- 67 Nightingale Building
- 85 Institute for Life Sciences



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## APTS Timetable

	Monday 23 March	Tuesday 24 March	Wednesday 25 March	Thursday 26 March	Friday 27- March
09.30 – 11.00	Registration (11.15 – 12.45)	<b>Statistical Asymptotics</b>	<b>Statistical Asymptotics</b>	<b>Statistical Asymptotics</b>	<b>Statistical Asymptotics</b>
11.00 – 11.30		Coffee			
11.30 – 13.00		<b>Statistical Modelling</b>	<b>Statistical Modelling</b>	<b>Statistical Modelling</b>	<b>Statistical Modelling</b>
13.00 – 14.30	Lunch				
	Welcome (14.00–14.15)				
14.30 – 15.30	<b>Statistical Asymptotics (14.15–15.45)</b>	<b>Statistical Asymptotics</b>	<b>Statistical Asymptotics</b>	<b>Statistical Asymptotics</b>	
15.30 – 16.00	Coffee				
16.00 – 17.15	<b>Statistical Modelling (16.15-17.45)</b>	<b>Statistical Modelling (Computer lab)</b>	<b>Statistical Modelling (Computer lab)</b>	<b>Statistical Modelling (Computer lab)</b>	
19.00 – 20.00	Dinner			Academy dinner (19.00 – 21:30)	
Evening	RSS Wine Reception (20.00 – 22:00)	Southampton Q&A event (20.30 – 21.30)	Free evening		

(Please see the accompanying notes on the following page.)

## Timetable notes

- **Locations:** All the lectures will take place in the Murray Lecture Theatre (Room 1067) in Building 58 (Murray). The computer labs will take place in Building 58 (Murray) in rooms 1007, 1025 and 1039 (laptops only), for participants without laptops a computing workstation is available in Building 58 room 1043.
- **Laboratory sessions:** You are encouraged to bring your own laptop to work on during these sessions. Detailed information about software requirements and configuration can be found at: <http://www.stats.ox.ac.uk/~ripley/APTS2011/>.
- **RSS wine reception:** This will take place in Highfield Hall.
- **Tea and coffee:** From 9.00-9.30 Tuesday to Friday, tea and coffee will be available in the foyer of the Murray Building. The other tea and coffee breaks during the week will be served in the University Social Centre (building 38 on the Highfield Campus map).
- **Lunches:** On Monday there will be buffet-style lunch in the foyer of the Murray Building. From Tuesday to Thursday lunch will be served in the University Social Centre (building 38 on the Highfield Campus map).
- **Dinners:** All participants who signed up for the food option are booked for dinner at Highfield Dining Hall on Monday-Wednesday evenings.
- **Southampton Q&A event:** On Tuesday evening we have invited some recent PhD graduates to take part in a Q&A session. More details about this event will be available nearer the time.
- **Academy dinner:** This will take place at the University Social Centre. The bar will be open from 7.00pm and dinner will be served at 7.30pm. Smart-casual dress is recommended.

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# Module Details

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## Statistical Modelling

MODULE LEADER: ANTONY OVERSTALL AND DAVE WOODS

Aim: The main aim of this module is to introduce important general aspects of statistical modelling, including Bayesian modelling, and to introduce some fundamental aspects of data collection. A broad range of specific, commonly-used types of model will also be encountered.

Learning outcomes: After taking this module, students should — for topics listed below which are included in the module — understand the issues (why this is important), the terminology, the statistical principles associated with this aspect of modelling, and sufficient theory to deal with simple examples; and they will have gained some practical hands-on experience in more complex examples.

Prerequisites: Preparation for this module should (re-)establish familiarity with linear and generalized linear models, and with likelihood and Bayesian inference. Students who are familiar with (for example) chapters 4, 8, 10 and 11 of Davison (2003) “Statistical Models” will be very well prepared (and will already know something of the areas to be covered in the module).

Topics:

- Principles and practice of model selection;
- Random-effects/hierarchical/mixed models;
- The role of conditional independence in modelling and an introduction to graphical models.
- Data collection and an introduction to design of experiments.

Assessment: Exercises set by the module leader, which will include some practical data analysis and statistical modelling.

# Statistical Asymptotics

MODULE LEADER: ANDREW WOOD

Aims: This module has the twin aims of introducing students to asymptotic theory and developing their practical skills in using asymptotic approximations.

Learning outcomes: After taking this module, students will have a basic understanding of the asymptotic properties of parametric likelihoods and posterior distributions, and the knowledge and skills to derive and implement first-order Laplace and saddlepoint density approximations in simple examples.

Prerequisites: Preparation for this module should establish:

- basic knowledge of likelihood methods, exponential families and Bayesian inference, to the level developed in a typical third-year undergraduate inference course;
- knowledge of limit theorems in the univariate IID case (laws of large numbers and CLT);
- familiarity with different modes of convergence (convergence in distribution, in probability, almost sure and  $L_p$ );
- familiarity with Taylor expansions in the multivariable case;
- familiarity with  $o(\cdot)$ ,  $O(\cdot)$ ,  $o_P(\cdot)$  and  $O_P(\cdot)$  notation.

Topics:

- Multivariate central limit theorem, (a gentle introduction to) the continuous mapping theorem, the delta method;
- Stochastic asymptotic expansion;
- Likelihood asymptotics (including asymptotic properties of MLEs);
- Asymptotic normality of posterior distributions (parametric case);
- Laplace's approximation (univariate and multivariate);
- Introduction to Edgeworth expansions and saddlepoint density approximations (via tilting);
- Saddlepoint approximations to tail probabilities.

Assessment: A mini-project which ideally has both a theoretical component (e.g., discussion of conditions for asymptotic normality in a particular set-up, or derivation of a suitable approximation in particular examples) and a computational component (e.g., numerical implementation of a Laplace or saddlepoint approximation).



