



WEEK 2: UNIVERSITY OF SOUTHAMPTON

8 – 12 April 2019

Welcome to Southampton!

The City of Southampton: The city has numerous parks and open spaces, including Southampton Common, situated near our Highfield Campus. The waterfront 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 (375km²), with open heaths and beautiful forest landscapes.

Workshop registration: Registration for the APTS week will be at the APTS registration desk, situated in the Mathematical Sciences Student Centre (Building 56 on the Highfield Campus map), between 11.15 and 14.00 on Monday 8th April. 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 either during the registration period or after lectures have finished on Monday. Secure luggage storage will be available for the afternoon of Monday 8th April and morning of Friday 12th April.

Car parking: Workshop participants staying in the Highfield Hall are able to use the car park but spaces are limited. Car parking in the Highfield Hall is free of charge for residents during the APTS week but a permit is required. Please contact Highfield Hall reception on arrival.

Messages: Urgent/emergency messages from colleagues or family should be directed to the main University Switchboard on +44 (0)2380 595000.

Other campus facilities: Facilities at the Highfield Campus include a University shop, Post Office, bookshop and several coffee shops. There are Santander and Barclays Banks on campus with cash dispensers. You will be able to use the Jubilee Sports Centre (Building 18 on the Highfield Campus map) on a pay-as-you-go basis.

Accommodation information

Your room: Workshop participants requiring accommodation have been booked rooms in Highfield Hall (Omdurman Road, Southampton, SO17 1AW). These will be available from **12.00** on Monday 8th April. Secure luggage storage will be available for the afternoon of 8th April and again on the morning of Friday 12th April.

Reception/Keys: You should check in and collect your keys Highfield Hall reception desk.

Internet access: Wireless internet access is available across campus and halls using eduroam. For those without eduroam access, there is also a guest wifi network.

Meals:

Breakfast: Piazza (Building 42 on Highfield Campus) will provide a full English or continental breakfast from 08.00 – 09.00 each morning of your stay.

Lunch: A sandwich “working lunch” will be served Monday - Thursday in the Mathematical Sciences Student Centre (Building 56) between 13.00 – 14.00. On Friday, a deli sandwich take-away lunch will be provided at 13.00.

Evening: Evening meals will be served in Piazza (Building 42, Monday and Tuesday), with a two-course cafeteria-style dinner. On Wednesday you are given the opportunity to visit restaurants in Southampton as part of your free afternoon/evening and some suggestions will be provided on Wednesday morning. The Academy Dinner on Thursday will be held in Garden Court (Building 38). Dinner will be ready to be served at 19.30. A cash bar in the Arlott Bar (also Building 38) will be open from 19.00 which serves a selection of beers, wines, spirits and soft drinks.

Emergency information

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 **999** (or 91-999 from a University phone) 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: 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 **999** (91-999 from a University phone) 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.

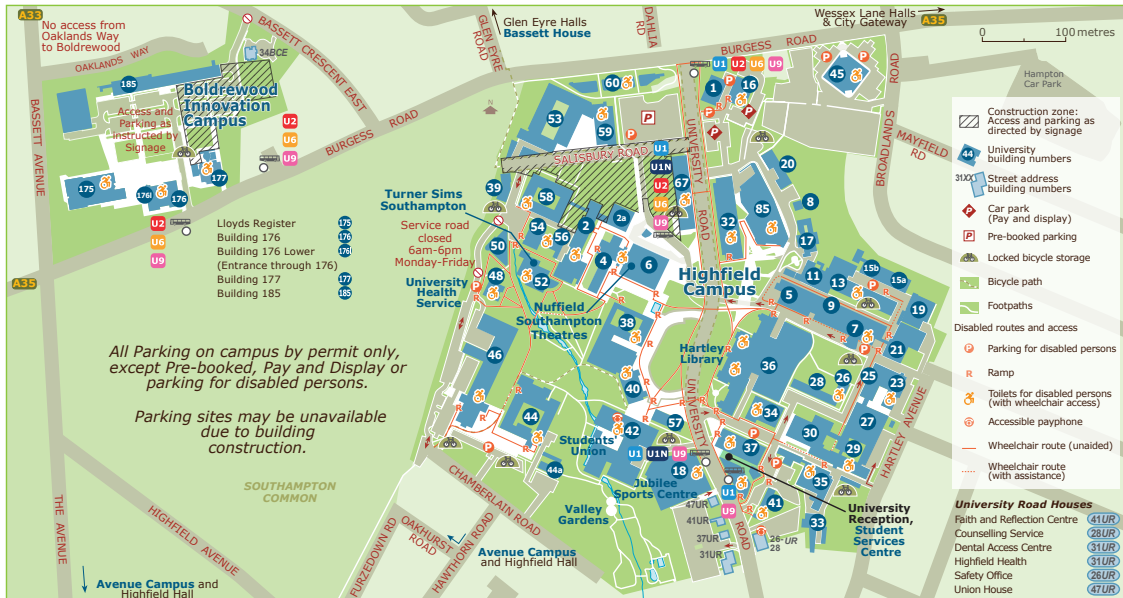
Do not stop to collect personal belongings.

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.

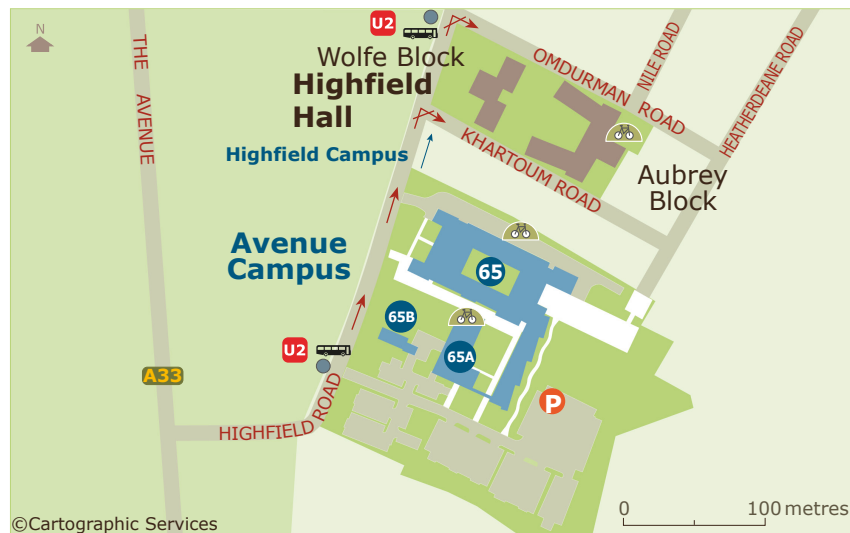
Highfield Campus & Highfield Hall maps

See also <https://maps.southampton.ac.uk>



Building 1	1 Energy Centre CHP	11 Faraday	21 EEE	31 Early Years Centre	41 Mountbatten
Building 2	2 Tizard	12 Building 23	22 E&F Maintenance	32 Students' Union	42 Mathematics
Building 2 Annexe	3 Wolfson	13 ESCience	23 Education	33 Shackleton	43 Human Performance Lab.
Law	4 Rayleigh	14 Building 26	24 David Kiddle	34 Building 44a	44 Students Union Shop
Eustice	5 Building 16	15 Chemistry	25 Library	35 Health Sciences	45 Murray
NST Campus	6 R J Mitchell Wind Tunnel	16 Froude	26 George Thomas	36 Physics	46 Zepler
Lanchester	7 Jubilee Sports Centre	17 Graham Hills	27 Catering Conf. & Hospitality	37 University Health Centre	47 Gower
A B Woods Laboratory	8 ISVR	18 Synthetic Chemistry	28 Social Statistics	38 Building 50	48 Nightingale
Engineering Workshop	9 Tony Davies High Voltage Lab.	19 Hartley Store	29 Garden Court	39 Turner Sims	49 Life Sciences
					50

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APTS Timetable

	Monday 08 April	Tuesday 09 April	Wednesday 10 April	Thursday 11 April	Friday 12 April
09.30 – 11.00	Registration (11.15 – 12.45)	Applied Stochastic Processes	Statistical Modelling	Applied Stochastic Processes	Applied Stochastic Processes
11.00 – 11.30		Tea & Coffee			
11.30 – 13.00		Statistical Modelling	Applied Stochastic Processes	Statistical Modelling	Statistical Modelling
13.00 – 14.00	Lunch				
14.00 – 14.15	Welcome				
14.15 – 15.45	Applied Stochastic Processes	Applied Stochastic Processes	Free afternoon	Applied Stochastic Processes	
15.45 – 16.15	Tea & Coffee			Tea & Coffee	
16.15 – 17.45	Statistical Modelling	Statistical Modelling (practical)		Statistical Modelling (practical)	
18.30 – 19.30	Dinner		Free evening		
Evening	Wine Reception (19.30 –)	Quiz (20.00 –)		Academy dinner (19.30 –)	

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

Timetable notes

- **Lectures:** All the lectures will take place in the Murray Lecture Theatre (Room 1067) in Building 58 (Murray).
- **Laboratory sessions:** You are required to bring your own laptop to work on during these sessions. The computer labs will take place in the Mathematical Sciences Student Centre (Building 56).
- **Wine reception:** This will take place in Piazza (Building 42).
- **Quiz:** On Tuesday, we will host a quiz in the Mathematical Sciences Student Centre (Building 56), starting at 20.00. Please bring your own snacks and drinks.
- **Lunches, tea and coffee:** These will all be served in the Mathematical Sciences Student Centre (Building 56).
- **Dinners:** All participants who signed up for the food option are booked for dinner at the Piazza (Building 42) on Monday and Tuesday evenings.
- **Academy dinner:** This will take place in Garden Court (Building 38). The bar will be open from 19.00 and dinner will be served at 19.30. Casual dress is recommended.

Module Details

Statistical Modelling

MODULE LEADER: HELEN OGDEN & ANTONY OVERSTALL

Aim: The main aim of this module is to introduce important general aspects of statistical modelling, including Bayesian modelling. A broad range of specific, commonly-used types of model will 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;
- Non-linear models.

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

Applied Stochastic Processes

MODULE LEADERS: STEPHEN CONNOR & MATT ROBERTS

Aims: This module will introduce students to two important notions in stochastic processes reversibility and martingales identifying the basic ideas, outlining the main results and giving a flavour of some of the important ways in which these notions are used in statistics.

Learning outcomes: A student successfully completing this module will be able to:

- describe and calculate with the notion of a reversible Markov chain, both in discrete and continuous time;
- describe the basic properties of discrete-parameter martingales and check whether the martingale property holds;
- recall and apply significant concepts from martingale theory (indicative list: optional stopping, martingale convergence);
- explain how to use Foster-Lyapunov criteria to establish recurrence and speed of convergence to equilibrium for Markov chains.

Prerequisites: Preparation for this module should include a review of the basic theory and concepts of Markov chains as examples of simple stochastic processes (transition and rate matrices, irreducibility and aperiodicity, equilibrium equations and results on convergence to equilibrium), and with the definition and basic properties of the Poisson process (as an example of a simple counting process).

Topics:

- Reversibility of Markov chains in both discrete and continuous time, computation of equilibrium distributions for such chains, application to important examples.
- Discrete time martingales, examples, application, super-martingales, sub-martingales.
- Stopping times, statements and applications of optional stopping theorem, martingale convergence theorem.
- Recurrence and rates of convergence for Markov chains, application to important examples.
- Statements and applications of Foster-Lyapunov criteria, viewed using the language of martingales.
- Statistical applications and relevance (highlighted where appropriate throughout).

Assessment:

- Complete appropriate exercises that are simple developments or extensions of aspects of the results in the module.

