

apts.ac.uk
Academy for PhD Training in Statistics

WEEK 2: UNIVERSITY OF NOTTINGHAM

16th April 2012 – 20th April 2012

EPSRC

Engineering and Physical Sciences
Research Council

Welcome to Nottingham!

Workshop registration: Registration for the APTS week will take place between 11.15am and 12.45pm on Monday 16th April 2012 at the main entrance to Lenton and Wortley Hall, University Park Campus.

You will receive your 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: You will be able to leave luggage safely at Lenton and Wortley Hall on Monday 16th April and on Friday 20th April.

IT: Delegates will be able to access the internet from the computer rooms in the Pope building using the class user ID, but only during the classes. There is good wireless coverage in the Pope building around the cafe area.

Accommodation location: All residential delegates will be staying at Lenton and Wortley Hall, University Park Campus (next to building 52 on the campus map)

Car Parking: Delegates who are staying in the Hall can obtain a parking permit from the Hall office when they collect their room key. This, when completed with details such as name, conference and hall of residence should be displayed in the car for Security to see, and then parking is free. There are spaces close to the the Hall.

Your room: Accommodation is in single rooms with shared bathroom and kitchen facilities. All bed linen, bath towels and toiletries (a shower gel, shampoo and soap) will be provided. There are also tea and coffee making facilities in the bedrooms. There are wireless hot-spots in Lenton and Wortley Hall. Wired access is available in individual rooms — please bring an Ethernet cable to take advantage of it. (The hall manager has a limited stock of cables which may be made available should you forget but please don't rely on this.) Login details will be provided on arrival.

Checking in/out your room: Keys for your room can be collected at the main reception area in Lenton and Wortley Hall. The Porter will be on duty until midnight. After that time, there is a free-phone number to ring for Security to come and provide your key. For participants who arrive in the 11.15 am – 12.45 pm window on the Monday, please register before picking up your key.

Meals: All meals will be in Lenton and Wortley Hall dining room. Breakfast will be from 8 am to 9 am, lunch from 1 pm to 2 pm, and dinner from 6.30 pm to 7.30 pm on Monday – Wednesday, and the Conference Dinner from 7 pm onwards on Thursday.

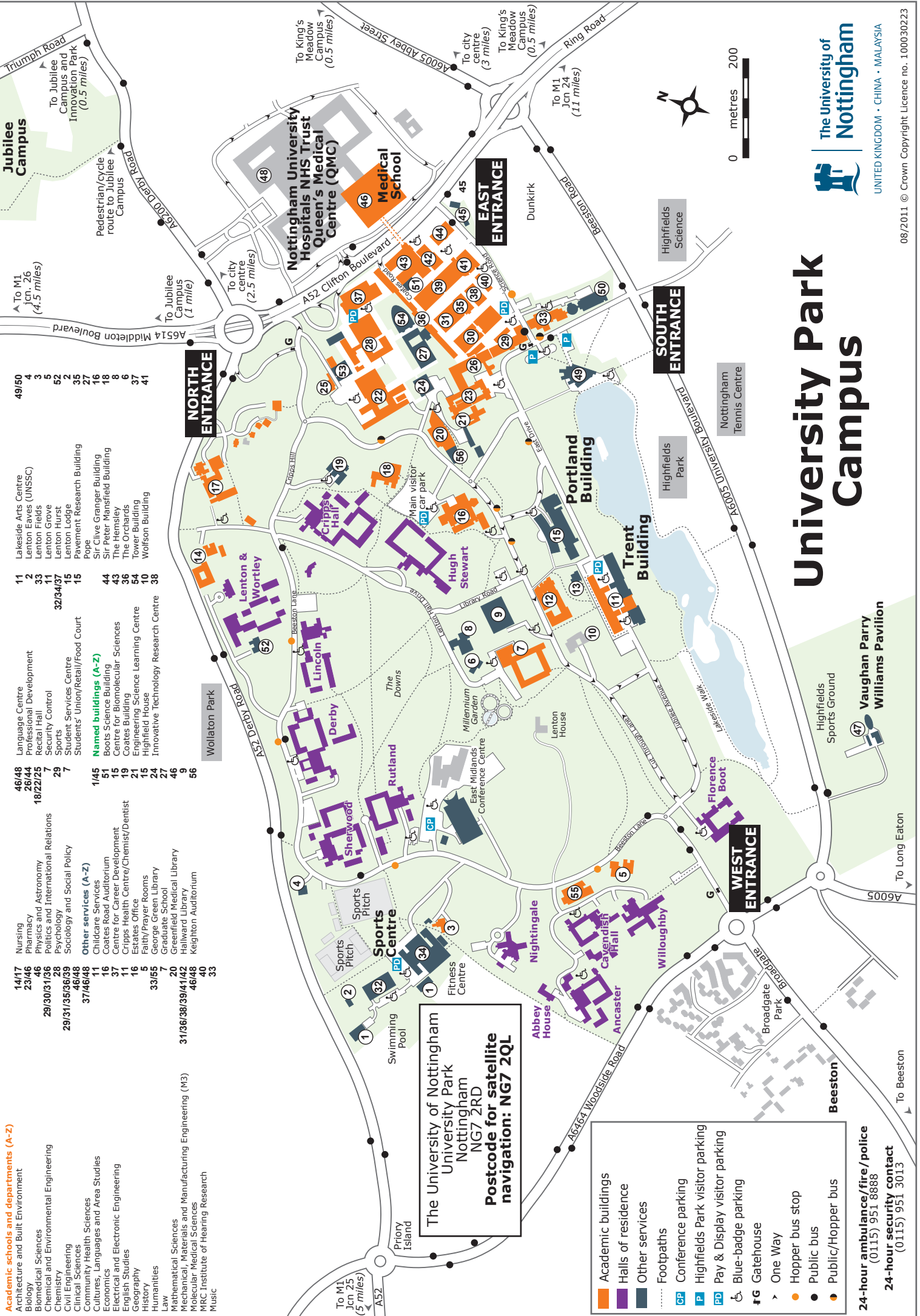
Academic schools and departments (A-Z)

Architecture and Built Environment
 Biology
 Biomedical Sciences
 Chemical and Environmental Engineering
 Chemistry
 Civil Engineering
 Clinical Sciences
 Community Health Sciences
 Cultures, Languages and Area Studies
 Economics
 Electrical and Electronic Engineering
 English Studies
 Geography
 History
 Humanities
 Law
 Mathematical Sciences
 Mechanical, Materials and Manufacturing Engineering (M3)
 Molecular Medical Sciences
 MRC Institute of Hearing Research
 Music

14/17 Nursing
 23/46 Pharmacy
 46 Physics and Astronomy
 29/30/31/36 Politics and International Relations
 28 Psychology
 29/31/35/36/39 Sociology and Social Policy
 46/48
 37/46/48
 11 Childcare Services
 16 Coates Road Auditorium
 37 Centre for Career Development
 19 Cripps Health Centre/Chemist/Dentist
 16 Estates Office
 5 Faith/Prayer Rooms
 33/55 George Green Library
 7 Graduate School
 20 Hallward Medical Library
 31/36/38/39/41/42 Hallward Library
 46/48 Keighton Auditorium
 33 Music

46/48 Language Centre
 26/44 Professional Development
 18/22/25 Rectal Hall
 7 Security Control
 29 Sports
 7 Student Services Centre
 32/34/37 Students' Union/Retail/Food Court
 15
 11 Lakeside Arts Centre (UNSSC)
 2 Lenton Eaves
 33 Lenton Fields
 5 Lenton Grove
 52 Lenton Hurst
 2 Lenton Lodge
 35 Pavement Research Building
 27 Pope
 16 Sir Clive Granger Building
 18 Sir Peter Mansfield Building
 8 The Hemshay
 6 The Orchards
 37 Tower Building
 41 Wolfson Building

11
 2
 33
 11
 15
 15
 44
 43
 36
 54
 10
 38
 17
 14
 19
 18
 16
 16
 13
 12
 11
 10
 9
 8
 7
 6
 5
 4
 3
 2
 1
 1
 2
 3
 4
 5
 6
 7
 8
 9
 10
 11
 12
 13
 14
 15
 16
 17
 18
 19
 20
 21
 22
 23
 24
 25
 26
 27
 28
 29
 30
 31
 32
 33
 34
 35
 36
 37
 38
 39
 40
 41
 42
 43
 44
 45
 46
 47
 48
 49/50



The University of Nottingham
 University Park
 Nottingham
 NG7 2RD
 Postcode for satellite navigation: NG7 2QL

- Academic buildings
- Halls of residence
- Other services
- Footpaths
- CP Conference parking
- P Highfields Park visitor parking
- PD Pay & Display visitor parking
- Blue-badge parking
- fg Gatehouse
- > One Way
- Hopper bus stop
- Public bus
- Public/Hopper bus

24-hour ambulance/fire/police
 (0115) 951 8888
 24-hour security contact
 (0115) 951 3013

University Park Campus



UNITED KINGDOM • CHINA • MALAYSIA

APTS timetable

	Monday 16th Apr	Tuesday 17th Apr	Wednesday 18th Apr	Thursday 19th Apr	Friday 20th Apr
09.15 – 10.45		Statistical Asymptotics	Statistical Asymptotics	Statistical Asymptotics	Statistical Asymptotics
10.45 – 11.15		Tea and Coffee			
11.15 – 12.45	Registration	Statistical Modelling	Statistical Modelling	Statistical Modelling	Statistical Modelling
13.00 – 14.00	Lunch				
14.00 – 14.15	Welcome				
14.15 – 15.15	Statistical Asymptotics (14.15 – 15.45)	Statistical Asymptotics	Statistical Asymptotics	Statistical Asymptotics	
15.15 – 16.00	Tea and Coffee				
16.00 – 17.00	Statistical Modelling (16.15 – 17.45)	Statistical Modelling (Computer lab)	Statistical Modelling (Computer lab)	Statistical Modelling (Computer lab)	
18.30 – 19.30	Dinner				
Evening	RSS Reception (19.45 – 21.00)	Free evening	Free evening	Academy dinner (19.00 –)	

Timetable Notes

Location of lectures: All APTS lectures and workshops will take place in the Pope building, University Park campus. The lectures will be held in room C16 and the three Computer Labs will be held in rooms A15 and A16 (Tuesday, Wednesday and Thursday, 4 pm to 5 pm).

Tea and Coffee: Tea and coffee will be served in room A14 in the Pope building.

Evening events: The RSS reception on the Monday evening (7.45 pm to 9 pm) will take place in the Lenton and Wortley Hall Junior Common Room. The Lenton and Wortley Hall bar will be open from 8 pm to 10.30 pm each evening.

Local Information

Sports facilities: Residential conference guests are permitted free access to the fitness centre and swimming pool during the APTS week; see the University Park campus map for where they are located. Guests should take their room key with them to the reception area of the fitness centre/swimming pool and they can use the facilities free of charge. It is also possible for guests to use the Astro turf, squash courts or tennis courts there is a charge for these facilities. Further enquiries can be made at the fitness centre.

Things to do in Nottingham:

Wollaton Park and Wollaton Hall. Wollaton Park is just north of the University Park campus and is a good location for a walk or a run.

Nottingham Castle. The Castle has excellent views of Nottingham and has a museum with some items of interest. Information for visitors can be found at <http://www.nottinghamcity.gov.uk/index.aspx?articleid=1036>.

Highfields Park. On the southern edge of campus you can stroll around the university lake or stop at the cafe and gallery at the Lakeside Arts Centre (buildings 49 and 50 on the map).

Cinema. Visit the nationally recognised independent cinema Broadway on Broad Street and further down the same street, the world's smallest cinema with just 21 seats, the Screen Room.

Emergency details

Medical Assistance: Please contact a local member of staff who will alert the appropriate services.

Fire Procedures: If the fire alarm sounds for more than five seconds and there has been no warning of a prolonged test, you must leave the building by the nearest emergency exit. All exits are well signed. 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 Services or the University security staff.

Module details

Statistical Modelling

MODULE LEADERS: J.J. FORSTER & D. WOODS

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 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's *Statistical Models* will be very well prepared (and will already know something of the areas to be covered in the module).

Topics:

- Missing data and latent variables;
- Principles and practice of model selection;
- Random-effects/hierarchical/mixed models;
- Semiparametric models and smoothing (links with the later APTS module 'Nonparametric Smoothing');
- The role of conditional independence in modelling. Introduction to graphical models.

Assessment: Either a suitably constructed 'comprehension exercise', for which students read a recent paper from the literature involving advanced modelling, and answer a series of questions, some of which may be quite open-ended; or a practical exercise involving real data and research questions.

Statistical Asymptotics

MODULE LEADER: A. 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).

